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HENRY V. POOR, Editor.

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American Railroad Journal.

PUBLISHED BY J. H. SCHULTZ & CO., 136 NASSAU ST.

Saturday, September 13, 1851.

Completion of the Portland and Montreal Railroad.

Assurances were held out to the people of Portland, and to the stockholders of the Atlantic & St. Lawrence railroad company, prior to the annual meeting, that the entire line might be completed in the autumn of 1852, in season for the fall business of next year. This expectation should not be encouraged, unless the proper measures are now taken to make the accomplishment of this result reasonably certain.

It is not too late even now to secure this most desirable consummation. The Parliament of Canada has just passed an amendment to their Railway Facility Bill, granting the Colonial guarantee of the *principal*, as well as the interest, on one half the cost of their portion of the line. These securities have been negotiated with the *Messrs. Barings* of London above par, and the funds sufficient to build their road are now at the command of the Canadian company. They are able and anxious to construct their portion of the work in season for the transaction of the fall business next year—or by October, 1852—if our portion of the line can be built at the same time.

Our company has some forty miles more of distance to build than the Canadian company. After passing Berlin Falls, at which place heavy rock cuttings are encountered, there are no physical difficulties that need to delay the work at all. From Berlin Falls to the Connecticut river, the grading is very nearly finished, with the exception of the rock cutting before spoken of. It is supposed that this point will not prevent the opening of the road to the Connecticut river the coming winter.

The action of the Board of Directors, the present month, will determine the question whether or not the road shall be opened next season. If the determination of the Board is not promptly made, the needful measures put in progress, the location perfected and made so as to enable the contractor to open the deep cuts next winter, and the equipment ordered forthwith, we cannot hope for the completion of the road prior to the fall of 1853.

The loss of interest for one year, on the present investment in the road, will be greater in amount than any sacrifice which prompt and decisive measures will entail upon the company. The New York and Erie railroad company built and equipped 127 miles of their road, required to finish their road to Lake Erie, in less than a single year, and the facilities for its construction were less than those found upon the line of the Atlantic & St. Lawrence railroad company.

It is not too much to expect that some assistance might be obtained from the proceeds of the public lands of Maine in connection with an application by the friends of the European and North American railway, for a similar purpose to the next Legislature.

Besides this, many States are looking to the public domain of the United States for assistance to their public works. The grant of alternate sections of land in aid of the Mobile and Chicago railroad, by the last Congress, may tend to the adoption of a general policy, on the part of the United States Government, which shall give to each State its share of the proceeds of the public lands for works of internal improvement. Such a policy should find Maine a claimant for a full share of the proceeds, if not the first to urge its adoption.—There are no enterprises more entitled to this assistance than the two great international roads of Maine.

What we particularly require now is, an elaborate report upon the position, the advantages, the prospects of the Portland and Montreal railroad under the present condition of affairs. The recent adoption of the 5½ feet gauge for all Canada, and the appropriations just made by the Canadian Legislature of $16,000,000 for the building of their Main Trunk Line, are by far the most important occurrences in relation to our road which have taken place for years.

If suitable measures are to be adopted at the present time, it is believed that the funds now wanted to complete the road might be advantageously obtained in the large markets. At any rate, a year ago it would have been an easy task to have done so, and the prospects of the road have been most favorably affected by the doings in Canada before spoken of.

The Boston Courier of Saturday says, there is a rapid increase in the importation of foreign merchandize into Boston *for the Canadian market.*—The great railway jubilee to come off next week in Boston has more reference to measures in progress to secure the trade of Canada than any thing else.

If Portland was fully impressed with the importance of an early opening of the Montreal railway, there would be no doubt of its accomplishment next year.

P.

"Railways 1812."—Honor to whom Honor is Due.—Col. Stevens.

H. V. POOR, ESQ.

A letter written by Robert R. Livingston, to show what was thought of railways forty years ago, has been going the rounds, and is copied into your paper from the National Era, "addressed to a gentleman who had asked his opinion, etc." I propose to give you the name of this individual, with letters from Gouverneur Morris, and the great De Witt Clinton, "Commissioners of Inland Navigation for the State of New York," when Col. Stevens enlosed a "Memorial to the Commissioners for Exploring the Route of Inland Navigation, dated 24th February, 1812," which Governor Clinton acknowledges the receipt of in fewer words than Mr.

Livingston discusses the subject in his letter quoted by you 11th March, 1811.— It should be 1812.

"ALBANY, 2d March, 1812.

"I have received your interesting communication addressed to the Commissioners of Inland Navigation, etc., and shall lay it before the board at their first meeting.

With my best compliments,

I am yours respectfully,

DEWITT CLINTON.

John Stevens, Esq."

The Memorial, with Mr. Stevens' "answer to the objections of Robert R. Livingston, Esq," are now before me, in a pamphlet of 42 pages, entitled, "Documents tending to prove the superior advantages of Railways over Canal Navigation.—Printed by T. & J. Swards, No. 30 Pearl street, N. Y., 1812."

It appears Col. Stevens prepared his "eight documents," with an "Introduction," to lay before Congress, after he had failed in the State of New York to get Messrs. Livingston, Morris and Clinton to entertain his "ingenious proposition"—meaning from their remarks, no doubt, *visionary*.

Gouverneur Morris, under date of Albany, 16th March, 1812, writes Col. Stevens:

"I am directed by the Board of Commissioners to transmit the enclosed copy of a report by the committee, to whom was referred your communication, recommending the construction of a wooden railway.

I avail myself of the opportunity, to present the assurance of that respect, with which I have the honor to be, sir,

Your obedient servant,

GOUVRENEUR MORRIS."

Of this report, which I may give you entire, I now present you the commencement, and the close. It should be stated in connection, that Col. Stevens, of the Revolutionry Army, was born 1750, and died 1838. He was the boon companion, associate, and often the host of Livingston, Morris and Clinton; consequently, they could not treat him as a crazy man; they therefore introduce their report with compliments to his mechanical talents.

"The committee, to whom was referred John Stevens, Esq.'s, communication, recommending a wooden railway, report that they have considered said communication with the attention due to a gentleman whose scientific researches and knowledge of mechanical powers, entitle his opinions to great respect, and are sorry not to concur in them.

"Mr. Stevens proposes a railway, on which a steam engine* is to propel, by a force equal to the competent number of horses, 100 tons, at the rate of four miles an hour.

"As horses move on the earth, when drawing a weight, it is believed that an equal power must, to produce the same effect, have sufficient hold on the earth: and it is doubted whether an engine in a wagon can work it forward with as much advantage as horses on a road.

"If the engine turn the wheels, and propel the weight by their friction on the railways, it may be questioned, whether the effect will equal expectation. The rims of the wheels (however accurate) will, it is apprehended, impede (by their friction) the progressive motion." * * * Then follows a page of like sapient objections. The report closes—"and thus we are definitely led to ask, whether a railway can be constructed of sufficient strength. It is proposed that 100 tons be put in motion on it, at the rate of four miles per hour, which is nearly two yards in a second. * * * But, if it can, the committee conceive that it must be composed of materials more solid and durable than wood." * * * [Col. Stevens proposed "*bar iron rails, half an inch thick, and four inches broad.*"] Mark the close of this singular report. "Moreover, it is self-evident that the same way will not do for carriages going and returning, the expenses, which would (it is conceived) for a single way, exceed that of a canal, must be doubled, and would therefore render the construction unadvisable, were it sanctioned by experience.

A true copy from the minutes.

[Signed,] JOHN L. MORTON,

Secretary of the Canal Commissioners."

Document VIII. is a full "*answer to the report of the committee.*" I would send it to you, did I not value it too highly as a railway curiosity, to trust it to the mail. What think you of his stating to Congress (page 6)—"The extension and completion of the main arteries of such a system of communication would by no means be a work of time. * * * It would be exempted totally from the difficulties, embarrassments and delays incident to the formation of canals. * * * To the rapidity of the motion of steam carriages on these railways, indefinite limit can be set. * * * The Proas of the Pacific ocean are said to sail at the rate of more than 20 miles an hour. * * * If then a Proa can be driven through so dense a fluid as water 20 miles an hour, (800 times more dense than air,) I can see nothing to hinder a steam carriage moving on these ways with a velocity of 100 miles per hour. This astonishing velocity is considered here as merely possible. It is probable that it may not in practice be convenient to exceed 20 to 30 miles per hour. Actual experiment, however, can alone determine this matter, and I should not be surprised at seeing steam carriages propelled at the rate of 40 to 50 miles per hour." How true to the letter, September 1, 1851.

JOS. E. BLOOMFIELD.

* At page 16, Col. Stevens observes—"A small engine then of 10 inches diameter, worked with steam, the elastic power of which was 50 lbs. to the circular inch [equal to 70 lbs. the square inch] would possess a power equal to 5000 lbs. on the whole area of the piston, moving with the velocity of three feet in a second. This exceeds the power of 20 horses; but one horse, as above stated, can transport 8 tons, and 20 horses 160 tons."

Self-Registering Magnetic Needle.

One source of error has constantly attended magnetic observations in the most perfectly constructed observations. The approach even of the observer has been sufficient to produce a disturbance in the magnetic needles or bars. This error, however, no longer exists. Each magnetic bar is made to carry a little mirror, which reflects the light of a lamp upon a piece of photographic paper kept constantly moving behind an opaque plate having but one small vertical opening. On this, for every minute of the twenty-four hours, each vibration of the needle is faithfully recorded. The chemical radiations of an Argand lamp supply the observer's place; and at the same time, as it records every change in the phenomenon of terrestrial magnetism, it is made to mark the most delicate alterations in atmospheric pressure, and to note every increase or diminution of temperature. At Greenwich, the magnets, the barometers, and the thermometers are all registered by the chemical power of light; and M. Faye and Gonjon, at Paris knowing the error of the human eye in observations on a bright object, have substituted the Daguerreotype plate for the purpose of ascertaining the actual diameter of the sun, and they propose to the principal observatories of Europe to determine by a similar method, the absolute time. Electricity now determines the longitude, and marks the transit of a star, and the sun's rays perform equally important offices to aid the natural philosopher in his delicate research for the truths which are as yet obscure.—*London Athenæum.*

From the London Mechanics' Magazine.

On Anhydrous Steam, and the Prevention of Boiler Explosions.

BY DR. HAYCRAFT, GREENWICH.

In the London Mechanics' Magazine, Mr. Frost, of New York, has with much talent developed his views on dry or anhydrous steam, which on the supposition of its having its own atomic constitution, he denominates *stame* He has given experiments which open a vast field for improvement, and his conclusions lead us to believe that the power of the steam engine may be prodigiously increased. Having about twenty years since, entertained nearly the same views as Mr. Frost, and having abundant reason to modify them, it may not be amiss to give an historical detail of the principal facts on which those opinions were founded. It will be at least advantageous to the reader, by warning him of those errors by which I have been misled, and will at the same time open to him the right path to improvement.

Being induced by the experiments of Broughton, who supposed that steam was ten thousand times rarer than water, and also by those of Desagulier, who put it down at fourteen thousand, I experimented by weighing steam in a copper ball, and afterwards weighing the same after having immersed it in boiling oil for some time, for the purpose of superheating and rarefying the steam. The particulars of this experiment I need not detail, as it is, I now perceive, liable to the same objections as Mr. Frost's, which I will afterwards explain. The result was, that by exposing steam to the temperature of boiling oil, its specific gravity appeared to be lessened to about one-tenth; that is, it expanded to about ten times its former bulk.

Encouraged by this apparently satisfactory experiment, I had a small steam engine constructed, with a cylinder of 4 inches, and furnished with a tubular condenser, by which I could measure exactly the quantity of steam consumed. The cylinder was furnished with a jacket, which was supplied by a small high-pressure boiler.

On working the engine with ordinary steam, it required eighty five revolutions to fill a given measure with the condensed steam; but on applying steam to the jacket of about 500 lbs. pressure, it required 920 revolutions to fill the same measure —the engine in both instances carrying the same weight on the paul. In this experiment, which was often repeated, it appeared that dry steam, or Mr. Frost's *stame*, is ten times more economical than ordinary or hydrated steam.

Having succeeded thus far, a high pressure engine was erected, with a nine-inch cylinder and a three feet stroke: the cylinder was so constructed that a fire could be made round it, and at the same time the supply of steam passed through tubes exposed to the heat of the furnace flues. The engine worked very well for some time, and with surprising economy of fuel; but as might be expected, the parts exposed to high temperature gave way, and the engine became useless.

Afterwards I had a small engine with the cylinder immersed in a mercury bath, with a metallic piston; this engine also gave great satisfaction for a time. It however occurred to me one day to make a calculation of the actual working of these engines; and I found to my astonishment, that although my rarefied steam or "*stame*" had, as I believed, ten times the rarity of ordinary steam, yet its performance was in all these cases about equal to what it should be, supposing it to have the rarity ascribed to it by Watt—namely, 1728 times greater than that of water. On examining this subject carefully, I fortunately recollected the remarkable admission of Watt, that in his best engines there was a consumption of steam double of what was required by calculation. We have here two remarkable facts: one is that a large engine, of Watt's best construction, consumes twice as much steam as it should by calculation; and the second is that a small engine, carefully made, requires ten times as much as is sufficient under a different management.

This must be explained either by supposing there

is some waste in the usual mode of operating with steam, or that, by superheating it, there is an absolute expansion of its volume.

To settle this latter point, the following experiment was made, which, though performed many years since, has never been published. The experiment was designed to ascertain the density of steam, but chiefly to determine what effect a superheating of it would produce.

A graduated tube was filled with mercury, the upper end being closed, and the lower immersed in a basin of mercury. Oxygen and hydrogen were introduced in the proportions which constitute water, to a certain mark which was noted.—Two coated wires being introduced at the lower end, the gases were detonated, and of course, reduced to water. The whole was placed in an oil bath, gradually heated to 210°, when steam was formed filling the tube to a point marked. On this, a calculation was made which came so near 1728, the expansion assigned by Watt, that I was satisfied of its general correctness. Having ascertained this point I proceeded to determine the other. which to me was of the greatest importance, namely, how far an additional temperature would expand the steam, expecting that, at all events, it would have as much effect as is ascribed to it by Gay Lussac and Dalton namely, as doubling the volume for every 480°.—My surprise was indeed great, when I found that an increase of 10° made no perceptible difference in the volume of the steam. I then gradually raised the temperature of the oil bath to 285° without perceiving the least expansion; indeed, it appeared very slightly to have contracted its bulk—arising, I suppose, from the expansion of the glass tube. I did not raise the temperature higher—my apparatus unfortunately not admitting of it—and I was completely satisfied that an additional temperature of 75° did not expand the steam. The experiment was several times repeated with the same result.

How can this experiment be reconciled with those of Mr. Frost, who finds that an addition of 4° doubles the volume of the steam? There is such an air of candor about Mr. Frost's communications, that I am disposed to give full credit to the facts which he details; and the only way I can think of to reconcile the discrepancy, is to suppose that some mismanagement has taken place either in his experiments or mine. On examining his apparatus, as represented in figs 4 and 5, page 252, No. 1390, and his mode of using it, I find that the whole syphon is filled with water, which being converted into steam at a high temperature, the superabundant water escaping, is thereby filled with *stame*. The syphon being then hermetically sealed up, was suffered to cool; an engineer's vacuum, as he aptly terms it, is formed. Now, in this process it must be observed, that the whole interior of the syphon must be covered by very minute globules of water. The mercury is then introduced, which would fill the syphon with the exception of these minute globules, which would be everywhere interposed between the quicksilver and the inner surface of the tube. Then, on applying heat at the boiling point, the globules of water at the upper part of the syphon only are converted into steam; the remainder is kept in the aqueous form by the weight of the column of mercury incumbent upon it so that it is no wonder that an addition of 4° temperature would convert some of the globules of water into steam of double the whole column. The other instruments used by Mr. Frost are still more complicated, and I fear in their use would give rise to the same errors; and, as all the experiments were conducted in nearly the same manner, the results would be similar in them all. In such experiments the utmost care should be taken to operate in perfectly dry tubes.

Having said thus much in reprehension of the mode in which Mr. Frost's experiments were conducted, I will gladly take this opportunity of acknowledging the great importance of the experiments themselves, and of the relation of oil of turpentine, and the fixed oils to minute globules of water exposed to high temperatures. His papers deserve a most attentive perusal, especially his remarks on boiler explosions, to which we shall refer.

We shall now be able to return with advantage to the fact, that in the small engine spoken of, as an additional temperature does not expand the steam, and as when the steam was superheated the engine consumed only the quantity that it should have done by measurement, it will follow that the same engine, when it was worked with ordinary steam, and consumed ten times as much as in the former case, must have consumed ten times as much as it ought to have done by measurement.—Then comes the question, What occasions the loss? The same question applies to the other case, namely, What occasions the loss of one half of the steam which, we have seen, was the opinion of Mr. Watt himself, in his best engines? It has been stated that Watt ascribed this loss to unavoidable leakage by the piston, &c.; but on consulting several engineers on the subject, it appears that no very considerable loss could happen from this cause, as he took great pains in the finishing of his cylinders and pistons. It also appears that he had at least a suspicion of the true cause, which will be hereafter explained; namely, a cooling which takes place within the cylinder. The evidence of this is, that he took great pains to prevent it by clothing the working cylinder with non-conducting substances, and even by surrounding it with steam in a jacket.

While conversing with my brother on this subject, he remarked that he thought the cylinder was cooled by the evaporation which took place within it during the time of the vacuum, as the interior surface must be covered with a film of water every time the steam is admitted. The cause of the evil now appeared quite clear. The engine at first starting is, of course, colder than the steam; it therefore becomes loaded with the water; a vacuum is made in the cylinder; the water within is rapidly converted into steam; it derives its combined caloric (100°) from the metal of the cylinder and piston; these are cooled down by the abstraction of as much caloric as entered into the composition of the steam thus evaporated. Again, the supply steam is admitted into the cooled cylinder, and is condensed until the apparatus is raised to its own temperature; and not till then does it begin to act. Hence arises a fresh deposit of water, which is again evaporated with a production of cold; and thus the process continues as long as the machine acts. And here it may be noted, that this process constantly takes place in double-acting engines, for the vacuum process is constantly occurring either above or below the piston. On the other hand, in the bastard or Cornish engine, the vacuum takes place alternately, and only during one-half of the time the machine is in action. This may well account for the general economy of this machine. In addition to which, the adaptation of the steam-jacket—a fact now ascertained—will, as Mr. Frost observes, explain their vast superiority. The clothing of the boilers and steam pipes, and of the cylinder, together with the management of the furnaces, may also be considered subsidiary to their effect. Having thus ascertained the cause of the great waste of steam, it now became the question, How was it to be remedied? It was evident the plans hitherto pursued would not be practicable. It would be impossible to surround the cylinder with steam of the pressure of 500 lbs.; and I had ascertained that less would not effect the object even on so small a scale. Also, I had found that passing steam through metal pipes, exposed to the action of the fire, or of heated flues, was attended with practical difficulties which were insurmountable. It then occurred to me that as it was only required to raise the temperature of the cylinder a trifle above the condensing point, this might be effected, provided the whole of the supply steam were raised to an equal temperature, and that all uncombined water were prevented entering with it. In order to effect this it was necessary to have a very extended surface applied to the heating steam. I found afterwards that a fagot of tubes, being surrounded by the same steam that heated the jacket, answered the purpose. This fagot, being inclosed in a portion of the steam pipe, or in the heating boiler, I called a steamer.

The apparatus was applied to an engine belonging to Mr. John Penn. This engine was employed in turning one pair of millstones, and it was ascertained, by measuring the coals and wheat, that the consumption was 3·6 lbs. coals for each bushel of wheat ground.

This, considering the smallness of the engine, and its being of low pressure, is less than in any engine yet known; for even Wolf's engines on a large scale, with high pressure and expansion cylinders, consume from 3 lbs. to 6 lbs. for each bushel. I have since ascertained by calculation that this engine expended little above 8 per cent. more than it should by measurement, while even the Cornish engine expends 33 per cent more than the proper quantity.

On experimenting, however, with this engine, I found I had not produced the maximum effect. In order to explain this clearly, I will state the mode by which this was ascertained. The index of the injection valve was set to a given point; the temperature of the injection water was ascertained, also that of the hot-well; the difference of these in any one experiment compared with the difference between them in another, the quantity of the injection being constant, will give exactly the comparative quantities consumed in each case. By experimenting in this way, I found that on raising the pressure of the heating boiler from 30 lbs. to 60 lbs and even to 120 lbs. on the square inch, the temperature of the hot-well still diminished. This put me to contrive again; for it was evident that such high pressures were inadmissible, and yet I was desirous of producing, if possible, the maximum effect. A plan then occurred of a priming or separating-box of a very simple construction, which, by giving a circular motion to the supply of steam before entering the siccator, would, by the centrifugal force acquired by the free water which always rises from the boiler, be separated and fall to the bottom of the apparatus. This priming box was consequently applied when I was gratified by observing its effect; for on raising the temperature of the heating boiler from 29 lbs. to 90 lbs., no diminution of temperature took place in the hot-well. This was a full proof that the maximum power of the steam was produced. The pressure of the heating steam was afterwards diminished to 15 lbs. on the square inch, on which an increase of temperature took place in the hot-well of 5 per cent. The pressure in the supply boiler was 6 lbs., so that a difference of about 9 lbs. or about 18°, is sufficient to enable steam to produce nearly its full dynamic effect. This difference would suffice, but by increasing the surface of the tubes in the siccator, the maximum effect may be easily produced at a less temperature.

About this time the matter came under the notice of the Admiralty, and the lords were pleased to grant a sum for experimenting on this engine. The experiments were conducted on the same plan as before, except that a dynamometer was applied, which was loaded to indicate about 18 horses power; which same power was also shown by the indicator. The experiments were under the inspection of the Comptroller and Inspector of Steam Machinery, and performed by Mr. Wright, one of the engineers of the Admiralty. The experiments were comparative, and showed the expenditure of steam under equal loads; first of the engine without steam in the jacket, then with ordinary steam in the jacket, and lastly, with the siccator, &c., as above described added to the engine. The temperature given to the injection water being ascertained, and the power being inversely as these quantities, it appears that the apparatus produces a saving of 25 per cent. compared with the engine with ordinary steam in the jacket, and of 46 per cent. compared with the engine without steam in the jacket.

These quantities, however, must not be considered as indicating the whole of the saving which would be produced by the application of anhydrous steam to engines in general; for this reason, that the engine on which the experiments were performed was so arranged as to produce the best possible effect without its use; for in addition to the engine being made by a first-rate engineer, there was abundant steam room in the boiler, the steam pipe was large and inclined downwards to the boiler, besides which the steam was applied to the jacket, not as is usually done, but in the same way as in the Cornish engines, or rather in a somewhat superior manner, as the cylinder cover was covered with steam, and every pains taken to insure the perfect action of the old method. On the other hand, in locomotive, or even in marine engines, where there is a confined steam space,—and especially in locomotives, in which an enormous power is forced from small boilers,—there must be a very

serious loss by the use of steam hydrated in a very high degree. The value of the anhydrous steam in these cases can hardly be appreciated.

The makers of locomotives appear to be aware of this in some degree, as in the newest engines the steam room is increased by means of large steam chests, &c., as much as the confined space will admit: but after all is done, the almost ruinous expenses of repairing these machines, attest the evil effects arising from the present system Capital would be well engaged in carrying out this plan with respect to locomotives and marine engines.

In consequence of these experiments, which were repeated in a variety of ways, a recommendation was made to apply the apparatus at the Government expense. This was about being done when its progress was arrested, in consequence of new regulations respecting experimental matters.

To be continued.

Enormous Increase of the Iron Business in Wales.

The increase of the iron business is, probably, unexampled in the history of the world. The population during the 40 years, from 1801 to 1841, increased in Newport from 1,423 to 13.766; in Trevethin, from 1,742 to 14,942; Aberystwith, from 805 to 11.272; Bedwelty, from 619 ta 22 413. This is the progress in Monmouth; in Glamorgan the increase has been, if not the same enormous proportion, still enormous in itself. Thus, during the same period, the increase at Merthyr has been from 7,705 to 34,977; at Cardiff, from 1,870 to 10,077; at Swansea, from 6,831 to 16,787. The progress in the actual trade is shown by the returns to be equally astonishing; in 1820, the iron sent from the works for shipment to Newport, was 45 462 tons, in 1847, 240.637. The quantity at Cardiff in 1820 was 50,157 tons; in 1847, it was 220,953; and this is exclusive of a quantity of iron shipped from smaller ports which owe their existence to the last 20 years. We scarcely believe that any other country could show a similar result in one branch of business. The quantity of coal sent in 1846 from the four ports of Cardiff, Swansea, Llanelly, and Newport, amounted to 1,847,318 tons. The value of the shipments of iron alone from the counties of Monmouth, Glamorgan, and Carmarthen, was estimated in 1847, at £1,000.000.

Application of Hot Air in the Smelting of Iron.

At the smelting furnace of Plous, in Wurtemberg before employing the hot air, the consumption was 100 kilos, (2 cwts.) of ore, 40 cubic feet (48½) of charcoal, and the produce under the old system, was 3,000 kilos. (3 tons), while with the hot air, it is on an average 37,500 kilos (3¾ tons. At Koningsbronn, in the same kingdom, to obtain 108 livres (1·17 cwts.) of bar iron with cold air it required 20 cubic feet (24 2 England c. f.), and with hot air only 17 cubic feet (20½). The temperature to which the air is raised is, however, much inferior to the lowest standard in this country; for at Plous. according to Berthier, the temperature of the heated air is only 150° or 200° [302° 492 Fahr.], while at the Clyde-Iron-works, the usual test of the standard temperature is the melting point of lead, or 606° Fahrenheit. This is the lowest point to which the heat is allowed to fall, for it may in general be much higher; yet, even with this disadvantage in Germany, we see that the expenditure of the combustible matter has been reduced one-fourth with a sensible increase of the product. The effect of the heated air has commonly been attributed to the absence of the cooling power which was exercised by the cold air on its being introduced in contact with the heated contents of the furnace. Berthier denies that this is the mode in which it operates. He thinks that the phenomena which result from the employment of hot air proceed from the greater activity of the combustion in the furnace than when the air has not been previously heated—that is to say, that with the same weight of air there is more oxygen absorbed in the first case than in the second. If this opinion is correct, it follows that less hot air will be required than of cold air for the combustion of an equal quantity of charcoal in the furnace, and that the air which proceeds from the latter being possessed of little oxygen, cannot support combustion. Now, the exhaustion of the oxygen in the air is a point of essential importance, when we wish to obtain a very strong heat; for the azote of the air only assists in producing a loss of the portion of the heat developed by combustion. Hence, the less air that is consumed, the less does this cause of cooling operate. Besides, the affinity of gas for solid substances is increased by the heating of the gas. It has been said that effects similar to those produced by heated air may be obtained by the employment of cold air, sufficiently compressed, or what would be extremely powerful, the use of hot air compressed to such a degree as experience might point out.

Magnetic Action on Railways.

It is well known that an opinion has prevailed among scientific men for a few years, that railway axles, after having been used for some time, become crystallized by galvanic action, and are then very easy of fracture. The subject was brought before the last meeting of the British Association by Mr. Greener, who, without questioning the fact, stated that the axles were affected with electricity generated by the bearings and the journal while in rapid motion. He said, that by subjecting inferior iron to currents of electricity, it was soon changed into a crystalline state, and lost its tenacity.

Mr. Stephenson said, that it was dangerous to assume facts and reasoning from the assumptions of Mr. Greener. With respect to the influence of vibration on the structure of iron, he considered that there was good room to doubt that the bearing force or pressure upon metals caused crystallization. It was by no means proved that railway axles were subject to the passage of currents of electricity, and therefore—granting the assumption that the passage of the electric current changed the character of the iron—there was a link wanting in the chain of reasoning, insomuch as it was not proved that axles were subject to this electric influence. Moreover, he was inclined to doubt whether, if a piece of iron was at first perfectly fibrous, vibration would ever change the structure of the metal. The beams of Cornish engines, for example, were subject to vast pressure; they never become crystallized; the connecting rod of a locomotive was subject to great vibration, strain, and pressure, vibrating eight times a second when the velocity is forty miles an hour; he had watched the wear of a rod for three years. and no change was perceptible in the structure of the iron.

Electro-Metallurgy.

This has already become an important branch of industry; and the advantages which plating by the agency of electricity possesses over the older process will be readily understood when it is stated that previous to this discovery, raised surfaces, and especially high relief, which are cast, could not be produced on articles of plate in any other metal than pure silver. Hence, plating was confined to articles having a plain surface; or when applied to ornamental designs, such as a salver, or a dish with a raised border, the relieved portion was formed of a thin stamped surface of silver, filled with base metal, and attached to the body of the article. It is evident that this process was extremely limited in its application to ornamental manufacture; but by the electro system, the subtlety of the agent employed in plating carries the particles of decomposed metal to every crevice of the composition, and hence no elaboration of ornament, height of relief, or complication of design presents the slightest difficulty to the electro-plater.

The following is a brief description of the process of plating:

The base, or body upon which the pure silver is deposited, is a white metal, approximating to silver in color and density of structure. The troughs are three parts full of a solution consisting of dissolved or decomposed silver, and an alkali called cyanide of potassium; this forms the plating solution. The articles to be plated are suspended in the solution by wires in contact with rods connected with the electric current, derived from a permanent magnet. A steady, inexpensive, and never failing current of electricity is evolved from the machine. The importance of uniformity cannot be overrated, as it enables the operator to calculate with precision the quantity of metal deposited in a given time.

The article to be plated having been suspended in the liquid, the magnetic current is passed through it; and the result of the action is that the solution is decomposed, the metal separated from the potash, and gradually deposited on the surface of the article—the thickness of the coating being determined by the duration of the immersion, the quantity of the solution, and the strength of the current. In the process of plating, the solution of course becomes exhausted of the metal. To keep up the supply, plates of pure silver are suspended in the liquid, and the silver dissolves as rapidly as the deposition on the articles takes place, atom for atom. Bi-sulphuret of carbon is added to the solution, to give the articles a polished appearance, so that they do not require burnishing.

The process of gilding is very similar; with this difference, that in order to expedite the operation, the solution is heated. It is at once evident that such is the command of the operator over the thickness of the coating, that the quality of the plated article depends altogether upon the character of the manufacturer; and upon that also depends the permanency of the plating. In the hands of a skilful operator, the covering adheres so firmly as to become one body with the metal on which it is deposited. If therefore, there ever is in any electro-plated articles a tendency to skin or peel off, the fault arises from the bad quality of the metal employed, or from the carelessness or incompetence of the operator, not from any defect in the system.

Progress of Manufacture.

The increase of manufacturing industry in Great Britain in sixty years is shown by the following table of the raw materials used in that kingdom:

	In 1790.		In 1849.	
Wool.....	3,245,352	lbs.	76,756 173	lbs.
Silk.....	1,253,445	"	6,881,861	"
Hemp.....	592,306	"	1,061,263	"
Flax.....	258 222	"	1,806,786	"
Cotton.....	30,574,374	"	758,841,650	"

Origin of the use of Steam in Propelling Boats.

The last Patent Office report furnishes some very interesting information in regard to the origin of the use of steam in propelling boats, and is not generally known. It is presented in documents found in the archieves, and addressed to the Legislatures of Virginia, Maryland, New York and Pennsylvania, and to private individuals, whose dates range from 1784 to 1788.

From these documents it appears that within the period stated, two persons, James Rumsey and John Fitch, got it into their heads that they could propel boats by steam, and a contest rose between the two as to whom the right thus to run boats belonged as the first discoverer. In September, 1788, Rumsey presented a petition to the honorable representatives of the commonwealth of Pennsylvania, praying that "he be granted the exclusive right to the steamboats," which petition was opposed by John Fitch, who represented that the right was already vested in him by a special act of the Assembly, passed on the 28th March, 1787. Mr. Fitch in March, 1787, also obtained from the Legislature of New York, the exclusive right to run steamboats on the waters of the state. These grants were made after the committee had seen his boat and machinery, not then completed, but which he completed the next year, so as to run his boat on the Delaware river, at the rate of four miles an hour. On another trial run between Philadelphia and Burling-

ton, she made twenty miles in three hours and ten minutes. But though Fitch got the start of Rumsey in New York and Pennsylvaria, the latter headed him in Virginia and Maryland. The Legislature of the state vested in James Rumsey the exclusive right to run steamboats, by an act dated January 22d, 1785, though the application was brought before the body as early as November 11th, 1783.

Lecture on Minerals at the Crystal Palace.

The following is an abstract of a lecture delivered by Prof. Ansted at the Crystal Palace, in June last, on the metals. He commenced with iron, as the most important, and proceeded to show how it was obtained, and the modes by which, when produced, it was reduced, so as to be serviceable to mankind. Iron was rarely found native; it was occasionally discovered, but when that occurred it was generally in the form of meteorites, which were now very scarce in Europe. In South America many blocks had been seen; this, however, might arise from the circumstance that as that was comparatively a new continent, it had not been so well explored as countries in the other hemisphere. The largest mass of this meteoric iron hitherto found, had been said to weigh 30,000 lbs. All impure iron contained carbon in greater or less quantities. The different kinds of iron were then described. Cast iron was hard, but wanted toughness; it was like glass, being brittle and easily broken; there was a great similarity in their component parts between cast iron and steel. Wrought iron could be twisted into a knot, or beaten out into thin plates; a wire drawn out to one-twelfth of an inch was capable of supporting the weight of 550 lbs. Iron, though not generally found in a pure state, was present in all vegetable matter, in all earthly minerals, and there was not a clay which did not contain some portion of iron. One of the most important of the ores was the magnetic, which consisted of the peroxide and protoxide of iron; this was found in Scandinavia; in that country there were about 350 furnaces in blast, and the annual production in round numbers might be estimated at 50,000 tons. The mine of Dannemora, which was one of the most celebrated, had been worked upwards of three centuries.

Russia likewise produced superior ores, as well as India. Nearly all the Sheffield cutlery was made from magnetic iron. In the island of Elba there is a large mountain mass, about two miles in circumference and 500 feet in height; the production, however, was not very large, which arose principally, from the difficulty of obtaining fuel. Two remarkable mountains of this kind were to be found in the United States, on the borders of the river Missouri. The ores most commonly found in England were of that species denominated hematites. Allusion was made to bog-iron ore, which contained much less sulphur than other varieties, and when fused with charcoal made the best iron. The ores in France were mostly hydrates; and the French iron, though good of its kind, was made at a monstrous cost. The spathic iron of Styria was also mentioned; the ores were first exposed for some time to the air, and then iron was run down by a single fusion. The metal from this carbonate of iron was then fit for use, and the Styrian scythes were known over the world, and formed a considerable article of the export trade from Austria. Another species of iron was iron pyrites; this, from the great quantity of sulphur it contained, was of no value for iron, but was used for the manufacture of sulphur. Notice was taken of various alloys; among others Franklinite was mentioned, which was an ore of iron and zinc. The conversion from iron to steel was then gone into, and the different methods of obtaining shear, blister and cast steel, with their several qualities, fully discussed.

Copper was next in importance to iron. It had been longer known than that metal; and in every country had been used for tools, previous to a knowledge of iron being acquired. It was remarkable for its sonorousness and tenacity, as well as for the purposes to which it could be applied in the arts and sciences. It was found in several combinations, and in various localities. The common ore of copper was the yellow pyrites, which was first calcined, and afterwards reduced by different processes to the copper of commerce. Copper was found in combination with nearly every other metal, and its ores were numerous. Vitreous copper ore had been found in some quantity in Silesia and Saxony. Large quantities of native copper had been found in the United States, on the borders of Lake Superior. The uses of copper, when manufactured, were too well known to require enumerating.

Silver was a metal likewise of great utility and beauty, but which on account of its value and comparative scarcity, did not enter so much into consumption as other metals. The ores of silver were sometimes found native; but this was not generally the case. The most common were the sulphurets; but it was often mixed with antimony, bismuth, and other substances. Great quantities had been obtained from South America, as well as Sweden and Norway; and not an inconsiderable amount was derived from the lead ores produced in England and Spain. Silver was excessively malleable, which adapted it to a great variety of uses. The oxide of silver gave an intense yellow color, and was used in the higher order of porcelain. The nitrate of silver was employed in medicine; and the bromines and iodides were extensively used in daguerreotyping.

Lead was rarely found pure; its texture was close, and it was distinguished by a total absence of tenacity. It was generally found combined with sulphur, and usually called galena; it was a most valuable metal, and adapted to a variety of uses. The production in England might be estimated at about 55,000 tons per annum. The fusibility of lead was well known, as well as the various uses to which it was employed as an alloy.

Tin occurred in but few localities; its great place of production in England was Cornwall. The tin mines of that county were well known to have been worked at a period anterior to the Romans. It was also found in limited quantities in the United States, Bohemia, France, Greenland, Sweden and Gallicia in Spain. The principal locality for tin in Asia, was the island of Banca and peninsula of Malacca. About 5000 tons were raised yearly from the islands of the Indian archipelago, and about the same quantity in England. The different modes of dressing and smelting, were then described at some length.

The production of zinc in England was not far from 1200 tons per annum; it was also imported from Germany. Its ores were known under the name of calamine and blende. Cadmium had been found in Silesia associated with it; and there was some probability it might be used extensively for galvanic purposes.

Mercury, and the scarcer metals—palladium, rhodium, osmium and iridium—were then alluded to, in their natural state as well as metallic form. The professor mentioned the different descriptions of minerals with which they were found associated; but our limits preclude a more detailed account.

Bridge Across the Medway.

From the London Architect, for June, 1851.

On the Pneumatic Method adopted in constructing the Foundations of the new Bridge across the Medway, at Rochester. By John Hughes, Assoc. Inst. C. E.

This bridge was described as being designed to consist of three large openings, a central one of 170 feet in width, and two others, each of 140 feet in width, spanned by cast iron segmental girders, and of a passage to admit masted vessels to the upper part of the river, across which a moveable bridge would be placed. Each of the river piers occupied an area of 1,118 square feet, and rested upon a series of cast iron cylinder piles, 7 feet in diameter, placed 9 feet apart longitudinally, and 10 feet transversely, so that there were fourteen under each pier. The cylinder piles in the abutments were 6 feet in diameter, of which the "Strood" abutment required thirty, and the "Rochester" abutment 12. Each pile was composed of two, three, or more cylinders, 9 feet in length, bolted together through stout flanches; the bottom length had its lower edge bevelled, so as to facilitate the cutting through the ground. The bed of the river was originally presumed to consist of soft clay, sand, and gravel, overlaying the chalk, and accordingly the application of Dr. Potts' pneumatic method of forcing the cylinder piles into the ground, which had been successfully carried out in similar positions, was contemplated; but after a few trials, the ground was found to consist of a compact mass of Kentish ragstone, so that the mere atmospheric action upon the piles, induced by a partial vacuum, would be ineffective in such a situation. It was therefore decided, that the pneumatic process should be reversed, so as to give each pile the character of a diving-bell; for which purpose one of the cylinders 7 feet in diameter, and 9 feet in length, had a wrought iron cover securely bolted to it, through which two cast iron chambers, D shaped in plan, with a sectional area of about six square feet appropriately called "air locks," projected 2 feet 6 inches above the top of the cylinder, and 3 feet 9 inches below the cover. The top of each "air lock" was provided with a circular opening 2 feet in diameter, with a flap working on a horizontal hinge, and an iron door, 2 feet by 3 feet 4 inches, with vertical hinges below the cover; each air lock was also furnished with two sets of cocks, the one for forming a communication between the cylinder and the chamber, and the other between the chamber and the atmosphere. Compressed air was supplied to the cylinder pile by a double-barreled pump, 12 inches in diameter, and 18 inches stroke, driven by a six horse power non-condensing steam engine. At first the expelled water was made to pass into the river, from beneath the lower edge of the piles, but when the stratum became so compact as to oppose a high degree of resistance to the passage of the air, an outlet was formed through the side of the uppermost cylinder, by the introduction of a pipe having the form of a syphon, the long leg of which reached the bottom of the pile, and was subject to the pressure of the condensed air, on the surface of the water within, whilst the short leg leading into the river, had the effect of relieving the amount of compression, provided a vacuum was once obtained in the body of the syphon. Such an effect was readily produced by connecting the summit with the exhausted side of the air pumps, by a pipe, which could be opened or closed at pleasure. To insure the down motion of the pile, and to give it a weight which should be at all times superior to the upward pressure, two stout trussed timber beams were laid on the top of the cylinder, in a direction suitable for bringing the adjacent piles into action as counterbalance weights, by four chains passing over cast iron sheaves.

Two light wrought-iron cranes were fixed inside the cylinders, the jibs of which swept over the space between the air locks and windlasses, inside and outside, for the purpose of hoisting the loaded buckets, and lowering the empty ones.

The method followed in working the apparatus was found to be so simple in detail, as to be perfect-

ly intelligible to all the workmen employed. The pumps being set in motion, the flap of one of the air locks and the door of the other, were closed; a few strokes compressed the air within the pile sufficiently to seal the joints, and whilst the pumping was in progress, the men passed through the air locks to their respective stations. When the water was shallow, the pile descended, by scarcely sensible degrees, as fast as the excavation by hand permitted; when the water was deep, the excavation was carried down full 14 inches below the edge of the pile, which then descended, at once, through the whole space, as soon as the pressure was eased off.

The most perfect certainty and success had attended the employment of this simple system, and as it promised to afford considerable assistance to engineers in the prosecution of similar works, the author laid the account before the Institution with the sanction of Mr. Cubitt, President Inst. C. E., the engineer-in-chief, and Messrs. Fox, Henderson & Co., the contractors for the work.—*Proc. Inst. Civ. Eng. May 13th*, 1851.

Railroads--Cheapness and Rapidity of Travel.

One of the most extraordinary features of this progressive age, is the comfort, rapidity, safety and cheapness with which great distances may be traversed in an almost incredibly short space of time. This fact will be especially apparent to western people, who, a few years ago, were in the habit of visiting the east by means of steamboats and stage-coaches. A trip of a thousand or fifteen hundred miles, one-half of which, perhaps, was to be performed in stage-coaches, with all the accompaniments of rough roads, sleepless nights, stiffened limbs and aching heads, was by no means a trivial affair. Nothing short of urgent bsiness could ordinarily induce one to undertake such a journey. In those days, travellers from the west to the east, made it a point to avail themselves of steamboats, to the greatest practicable extent.—Hence the usual route was up the Ohio to Wheeling or Pittsburgh, and thence by stage to Philadelphia or Baltimore. But the opening of the lines of railroad from Cincinnati to Lake Erie, and thence to New York, and the construction of the Central railroad of Michigan, have wrought a vast revolution in the lines of travel. Now, if one wishes to go from St. Louis, Louisville, or Cincinnati, to Baltimore, Philadelphia or Washington, he would scarcely once think of the route by Wheeling or Pittsburgh. Being at Cincinnati, he can go by way of Cleveland to New York in less than 48 hours, and thence through Philadelphia and Baltimore, to Washington in about fifteen hours more. In other words, he can go to Washington by this route, sooner than he could go from Cincinnati to Pittsburgh by boat. The result is, that for the present the Pittsburgh and Wheeling routes, are in a great measure abandoned, while the tide of travel over the railroads to Lake Erie, is almost incredibly great. Consequently, New York and Boston are now practicably nearer, and more accessible to the people of the West and a large portion of the South, than either Philadelphia or Baltimore; indeed, they can be reached quite as soon as Pittsburgh or Wheeling. Formerly the road from the West to New York and Boston was through Baltimore and Philadelphia. Now, however, it is precisely reversed; and the road to the latter cities is through the former ones. This extraordinary revolution in the routes of travel is, of course, attributable solely to the railroads of Ohio, New York and Massachusetts. These States, with profound sagacity, have made a vigorous effort to secure the rich trade of the West. Thus far, they have outstripped their rivals, and it is perfectly evident that unless Philadelphia and Baltimore bestir themselves most industriously, in pushing their railroads westward, they are destined to lose the greater part of the western trade they have heretofore enjoyed.—Nothing but the most vigorous action on their part can avert from them this great calamity. If once their trade with the West is lost even temporarily, it will be extremely difficult to build it up again.—Their customers will have formed new business connexions at New York and Boston, which cannot be easily disrupted, when permanently formed. In truth, the most superficial observer cannot fail to perceive that to compete successfully with their rivals, Philadelphia and Baltimore must, *without delay*, establish direct railroad communication with Cincinnati and St. Louis. We are astonished that the people of the two former cities have not long since foreseen this necessity and acted upon it.—They should not content themselves with reaching Cincinnati. This would by no means accomplish the ends desired. It would leave the trade of the rich States of Indiana, Illinois, Missouri and Iowa, to seek a vent through the railroads of Illinois and Indiana to the lakes, and thence to New York and Boston. They should, therefore, at once push a line or lines of railway directly to St. Louis, so as to afford the shortest and most direct route from the West to the East. Baltimore and Philadelphia should contribute liberally towards these roads, for several reasons—1st, because it affords the only means of preserving and increasing their trade;—2d, the people of the west have but little surplus capital which can be devoted to such improvements, whilst in the cities we have named, there are always ample means seeking investment. 3d, It would be an excellent investment of capital, and would return large and certain profits to the stockholders. During our recent visit to the east, we formed the acquaintance of Col. James Cook, the President of the Parkersburgh company, and were gratified to learn from him, that there was every probability of the early completion of this very important link in the line between Baltimore and St. Louis. Indeed, we regard it as past all doubt, that Baltimore will very soon be in direct communication by railroad with Cincinnati. But she should not be content with this. The road from Cincinnati to St. Louis must be made, and Baltimore and Philadelphia are deeply interested in its construction. They should remember that a railroad will soon be completed from Galena to Chicago; that another is being built from Rock Island to Chicago; that the Mississippi will again be tapped at Burlington, Iowa, by a road from Peoria, Illinois; that Quincy is constructing a road to the Illinois river, and that the great Central railroad of Illinois from Chicago to Cairo, will very soon be completed. Let them take a map and see how completely these roads, all pointing to Chicago, will drain the trade of Illinois, Iowa, Wisconsin and Missouri, and they cannot fail to perceive the absolute necessity of a great central road, running directly from the heart of the West to the East, in order to secure the trade of those States.—*St. Louis Intelligencer.*

For the American Railroad Journal.

Railroad Controversy in Indiana.

We understand that an injunction has been granted by a Judge in Northern Indiana, on the application of the Michigan Southern line of roads against the Michigan Central and New Albany and Salem railroad companies to restrain them from prosecuting their works in Northern Indiana in the direction of Chicago. By the law of Indiana, no injunction can issue unless there be ten days' notice given to the adverse party to appear and show cause against it, unless a case of pressing emergency be made out, which renders it unsafe to allow of the giving of notice. The Michigan Central and New Albany and Salem railroad companies are engaged in building about 130 miles of road in Indiana, 40 of which are between Michigan city and the Illinois line; and this latter is in a very forward stage of construction. Yet the emergency was made out to be so great, and the danger that that road would be made before the ten days expired was so imminent, that the Judge not only granted the injunction without notice, but he would not even delay action until the counsel for the defendants might arrive, which he was told would be in a few hours, as the friends of those companies had immediately dispatched messengers and telegraphic dispatches for them.

Hon. Hugh White and E. C. Litchfield, with their consel, went to the extreme North-western county of Indiana to make the application, passing through Detroit and La Porte, where they knew the consel for the defendants resided; saw and conversed with them, or one of them, but never intimated their object. They proceeded by stealth, knowing their claim would not bear discussion, and fearful of an hour's delay, lest counsel should arrive before the injunction should be made.

The counsel for the defendants arrived a few hours after it was made, one of them having traveled by express two nights to get there, and moved, as we understand, to modify the injunction upon giving ample security to the complainants for all damages in case their bill was sustained, which Judge Chamberlin declined to do, upon the ground that it would amount to a dissolution of the injunction, which could not be had except upon answer, though admitting that the facts stated in affidavits submitted, if stated in an answer, would make a strong case for a dissolution, and admitting, as we understand, that the claim of an exclusive right around the Lake by the complainants could not be maintained.

The counsel for the defendants, therefore, immediately took an appeal from the order granting the injunction, which suspends its effects for thirty days by the law of that state, and in the meantime will probably file their answer, and procure a dissolution of the injunction. The work, therefore, upon the road, we understand will not be suspended.

The argument which seemed to have been used with so much effect by the counsel for the complainants, was, that money was tight in the market, and unless they could keep up the opinion that they had a monopoly around Lake Michigan, they could not raise sufficient to continue their work.

Michigan City, Sept. 1, 1851. U.

Experience of English Railways.

From Lardner's Railway Economy, lately published, we gather some interesting facts relative to the working of the English railways:—

Analysis of 100 *Accidents, produced by Imprudence of Passengers.*

	Killed.	Injured.	Total.
Sitting or standing in improper positions	17	11	28
Getting off when train is in motion	17	7	24
Getting up on train in motion.	10	6	16
Jumping off to recover hat or parcel	8	5	13
Crossing the line incautiously.	11	1	12
Getting out on wrong side	3	3	6
Handing an article into train in motion	1	0	1
	67	33	100

The incautious railway passenger may derive a salutary lesson from this table. He will see from it that two thirds of the accidents resulting from imprudence are fatal to life, and that nearly seven of every ten of such accidents arise from sitting or standing in an improper or unusual place or position, or from getting on or off a train while in motion.

This latter circumstance should be most carefully guarded against, for it is a peculiarity of railway locomotion that the speed when not very rapid always appears to an unpractised passenger to be much less than it is. A railway train, moving at the rate of a fast stage coach, seems to go scarcely as fast as a person might walk.

It appears from an analysis of the return of accidents, made by the Railway Commissioners, that in every one hundred accidents the following is the proportion of the causes which produce them:

Accidents from collision	56
" broken wheel or axle	18
" defective rail	14
" switches	5
" impediments on road	3
" off rails by cattle on line	3
" bursting boiler	1
	100

From the following table it appears that short traffic constitutes the staple of the railway passenger traffic.

Year.	Aver. daily. mileage	Aver. number of passengers booked.	Aver. distance travell'd by each passenger. Miles.
1846	2,184,300	119,975	18.22
1847	2,205,494	139,440	15.74
1848	2,484,944	159,134	15.66
1849	2,978,535	194,854	15.30
1850	3,290,864	228,265	14.41

It appears from the official returns lately published, that the proportion of the revenues of the rail ways, arising from merchandise, has been gradually increasing.

In the following table we have given the receipts of the last six months of each of the last three years.

	Total receipts from			Per centage of total receipts by	
	Passengers	Goods,&c.	Total.	Passengers.	&c.
1848..	3,283.302	2,461,663	5,774,965	57.40	42.60
1849..	3,455.217	2.895.243	6,350,460	54.40	45.60
1850..	3,817,403	3,329,079	7,147,733	53.43	46.57

On comparing the gross revenue produced by the railways of the United Kingdom with the total length of lines under traffic, it will be apparent that the increase of traffic has proceeded in a much less ratio than the extent of the railways. In the following table we have given in the first column the average length of railways under traffic in each of the last three years, and in the second column, we have given the gross receipts of the last six months of each year:

	Railways under traffic.	Receipts.	Increased per centage of railways open	Increased per centage of receipts.
1848..	5,007	5,740 965	—	—
1849..	5.740	6,350,460	14.6	10.5
1850..	6,464	7,147,378	25.4	12.5

It appears, therefore, from these results, that while the railways were increased in length 14.6 per cent. in 1849, as compared with 1848, and 25.4 per cent. in 1850, as compared with 1849, the revenue proceeding from them was increased only 10.5 per cent in 1849, as compared with 1849, and only 12.5 in 1850, as compared with 1849.

The First Locomotive ever used in the United States is still in good running order on the Little Schuykill railroad. It was built in Liverpool, England, by Edward Bury. At that time it was necessary to send a man from England to put the engine in running order on the road. It was but twenty years ago that Edward Bury's engine was placed upon this road. Since then, the iron track has been extended throughout our land; the fierce breathing of the iron horse is heard in almost every valley; the ingenuity of our own Mechanics enables them to supply our own engines, and even furnish them to nations across the ocean.

Railroads in Northern Kentucky.

The *Kentucky Whig*, published at Mount Sterling, in Montgomery county, published an article recently in favor of a railroad from Lexington to the Big Sandy river, which would pass through the counties of Fayette, Clarke, Montgomery, Bath, Fleming, Carter, and a corner of Greenup. The charter granted by the Kentucky Legislature for a railroad from Lexington to Big Sandy, making Owingsville, in Bath county, an intermediate point, probably contemplates a route through Bourbon, via North Middletown, in that county. This route would leave Clarke and Montgomery counties out of its track; and it is in this view, we presume, that the *Whig* declares itself in favor of an amendment to this charter, so as to strike out the requirement that the railroad shall run by intermediate points, or else that a new charter more acceptable to Clarke and Montgomery, be obtained.

The *Maysville Eagle*, in commenting upon this project, suggests that a railroad from Mount Sterling to Paris would be more attainable, and more available when attained. Such a road would run through a rich productive country, the people of which are abundantly able to construct it, and the business of which would sustain it. Reaching Paris, they could connect with the Maysville and Lexington road, uniting the interior of Kentucky and Tennessee with the Atlantic seaports; the Covington road, leading to Cincinnati; and a road from Paris via Georgetown to Frankfort, on the direct route to Louisville. These roads will be finished, in all probability, as soon as Montgomery will find it practicable to make any connection whatever. And there is probably no other way in which so great advantages could be secured to that county with so little outlay.

The Southwestern Carrying Trade.

Continued from page 571.

The writer recommends that the different transportation companies invite the attention of the south to this route, by authorised publications or advertisements. It requires some degree of effort to turn the channels of trade in a new direction; but if the proper inducements be held out, the carrying trade must eventually take that route which is the cheapest and most direct. Much of the merchandise of those sections already takes this route, and it is the *producing interest* which must be operated upon and influenced in order to attain the full results desired. The tobacco and hemp grower and the cotton planter must be led to see that it is for their interest to seek this new outlet for the products of their industry; and ere long the effects will become visible in the large accession to the business of our channels of western communication.

The writer also proposes a small discriminating rate of toll in favor of all tobacco manufactured and unmanufactured, cotton, hemp, pork, lard and flour shipped from Louisville, and points south of that, to the Atlantic cities over the northern route. It is not the amount of discrimination made in the rate of tolls that will exert the desired influence upon the agricultural interests of the south that is wanted to secure the success of this project; but the mere fact that a discrimination is made in their favor at all, will command their attention and tend in a great measure to remove preconceived prejudices against all other modes of reaching the seaboard than by way of New Orleans.

He goes on to assign some reasons why this action should be taken by the canal board and the different transportation companies, as follows:

"It should be borne in mind that the Erie canal is by no means the only artificial avenue by which the southwest can reach the seaboard, even when they have determined to ship by the northern instead of the southern route. And it is proper that the canal board should bear this in mind, as well as the canal transportation companies, in whatever action they may conclude to take, should this vast trade be considered as worthy an effort on their part to secure it. During much of the navigable portion of the year, tobacco, cotton and hemp, can be sent direct from Louisville to Pittsburgh, and hence by the Pennsylvania canal to Philadelphia; but your route has the advantage in time and cost of transportation, if you see fit to employ it. There is also another more immediate rival route in the Erie railroad, and which must claim public attention in our section unless you offer to the southwest the superior advantages cheap tolls and cheap transportation upon your canal will hold out.—There is also a choice whether, upon reaching Toledo from Cincinnati by the Ohio canal, we shall send our staple products by sail vessels to Oswego, and thence by canal to Albany, or go by steam to Buffalo and thence through the entire length of the Erie canal. The Oswego route is now the cheapest, owing to the lake transportation sail vessels afford from Toledo to Oswego; but the delay by sail vessel navigation, and its increased hazard, will always give the preference to the Buffalo route, which is not only more speedy, but can be made the most economical. And although it may matter but little to the State of New York whether the products reach the tidewater by encountering her public works at Buffalo, or by striking them at Oswego, yet, in either contingency, it requires some exertion should be made to turn the southwestern carrying trade over either the one route or the other. Groceries have been sent by the Oswego route this season from New York to Cincinnati and Louisville, in the space of thirty days, at from fifty to sixty-five cents per hundred pounds; while drygoods, hats, boots, shoes, and other light goods, have been carried to the same points in sixteen days, from New York to Buffalo by canal, then by steam lake navigation to Sandusky or Cleveland, and thence by railroad to Cincinnati, at from a dollar to a dollar ten cents per hundred pounds. The Albany route, therefore, has a double advantage, if rightly employed by your public functionaries and citizens, over either the Erie railroad route, or the route by the Ohio river and the Pennsylvania canal. This must appear obvious to the most casual observer."

There is another article of perhaps equal importance with cotton and tobacco, the freight on which would yield a handsome revenue; this is the article of pork. During the last season, there were slaughtered and packed at Cincinnati, about 250,000 hogs, and at Louisville nearly 200,000. Whatever portion of this large number of hogs goes into mess or prime pork, or into lard, that is put up on northern account, or destined for the New York, Boston or Philadelphia markets, as well as canvassed hams, should come by this route; yet the southern route now gets the whole of it.

With regard to the rates of toll, the remarks of the Journal's correspondent are so well-timed and appropriate that we give them entire:

"Upon examining the rates of toll charged upon different articles freighted upon the canal, I find a very great distinction made between unmanufactured and manufactured tobacco. The toll upon the former is fixed at one mill per mile, while manufactured tobacco, not being specifically enumerated, is embraced under the head of "*non-enumerated articles of merchandise*," and is subjected to a toll of EIGHT mills. This would subject Kentucky manufactured tobacco, which has now become a large article of export, owing to its successful competition in markets on the seaboard with the Virginia and Maryland manufactured tobacco, to a toll seven times greater than the raw material has to pay, and would drive it entirely from this to other routes. Here the canal board can make a discrimination in favor of Kentucky manufactured tobacco reaching the tide water either by the Buffalo route or the Oswego route, that would designate to the southwest the policy the great State of New York intended pursuing, to invite the carrying trade of that section to avail themselves of the advantages of the northern route; and which, in my judgment, would turn at once large quantities of this species of freight through the Erie canal. It is no longer a doubtful problem whether Kentucky can successfully compete with Maryland and Virginia in manufacturing her own product, and sending it even into the markets heretofore monopolised by those States. The character of her tobacco is established, and there has been no difficulty in her selling advantageously all that has been prepared for immediate use; the consequence is, that there will be at least double the quantity manufactured the coming season in Kentucky for export, that was ever put up before in that State. And as an item of freight, it is worthy the notice that I propose the canal board shall take of it, in discriminating by a reduction of tolls upon all Kentucky manufactured tobacco going from Louisville or other points in the State, to tide water by the northern route and over our State public works. Upon the same article going *from* tide water, the toll could of course remain as it is.

As an excuse for delay, it may be said that it will be better to await action until your canal enlargement is completed. I cannot look at it in this light. In the rivalry that is now going on between the different States to secure the advantages to be derived from the southwestern trade, procrastination will be sure defeat to the State that adopts it. I notice that Pennsylvania is already contemplating an early revision of her canal rate of tolls and a large diminution from those as now charged; and may it not be from the apprehension that their canal cannot compete with yours when its contemplated enlargement is completed? Pennsylvania *knows* that if she can once get the carrying trade

of the southwest turned over her canals, and commercial relations fully established with the tobacco, hemp and cotton grower, that it will in all probability be a struggle of years for New York to get it away from her. New York, therefore, should be the *pioneer* in sending great staples of the southwest to the Atlantic cities over the northern route and through her canal; and when the trade is, by her exertions, turned in this direction, the vastly superior advantages that her enlarged canal will give her over any other sister State, will enable her to retain that trade in spite of all future competition."

American Railroad Journal.

Saturday, September 13, 1851.

☞ Mr. Poor is still prevented by illness from attending to his accustomed duties.

Massachusetts.

Ware River Railroad.—We learn from the Hampshire Gazette, that the annual meeting of the Ware River railroad corporation was held at Barre, on the 4th instant. The length of the road surveyed to Barre is 25 miles, and the engineer, Gen. Palmer, estimates the entire cost of this part of the road, including everything save engines, cars, etc., for operating the road at $375,000, or $15,000 per mile. The following persons were chosen directors of the corporation for the year ensuing: Hon. Thomas W. Williams, New London; Hon. Artemas Lee, of Templeton; Messrs. Jacob B. Merrick, of Palmer; S. Gilbert, Chas. A. Stevens, Joseph W. Hartwell, and Arthur L. Devens, of Ware, William Mixter of Hardwick, John Smith of Barre, George Williams of Hubbardston, Milton S. Morse of Winchendon.

The meeting was addressed by Messrs. Williams of New London, Hyde of Ware, Caldwell of Barre, Williams of Worcester, Palmer, the engineer and Mixter of Hardwick. On motion of Mr. Hyde of Ware, it was voted, that the directors be requested to make vigorous efforts to obtain subscriptions, so as to enable them to put the 1st section—from Palmer to Ware—and if possible the 2d section—from Ware to Barre—immediately under contract.

North Carolina.

Raleigh and Gaston Railroad.—The South Side Democrat, published at Petersburg, Va., says:

"The fate of the Raleigh and Gaston road is by no means determined. It seems to be the general impression that its re-construction will certainly be accomplished, and that the requisite amount of money has been subscribed. This is not true. Of the $400,000 to be raised in order to secure to the company the rights and privileges of the amended charter of last winter, but $300,000 are yet subscribed. It is understood that some ten or twenty thousand dollars worth of stock will be taken by the contractors for the iron for the road; and if this is done, still $80,000 will remain to be provided, before the re-construction of the road is certain."

The Democrat appeals to the citizens of Petersburg to give the further aid required, as the opportunity of securing the re-construction of the work, if now neglected, may never be again presented.—The citizens of Petersburg have already made liberal contributions to re-build the road, and if they will advance the remaining $80,000 required, it will give Petersburg a controlling voice in the management of its affairs.

Kentucky.

Louisville and Frankfort Railroad.—James Guthrie has been elected president of the Louisville and Frankfort railroad company, in place of John I. Jacob, resigned.

Steamer Line between Virginia and Europe.

There has been, for several months past, considerable talk about the establishment of a line of steamers to ply between James River and some foreign port. We see by recent Virginia papers, that there is a probability that something will soon be done besides talking on the subject. The merchants of that state have appointed a convention, which was to have been held in Richmond city on the 10th inst., to further the project of a line of steamers from Norfolk to Antwerp. The march of internal improvements, which enables the produce of the interior to reach the seaboard in a more speedy manner, requires corresponding facilities of transportation to foreign markets. According to the Richmond Times the tonnage engaged in the direct foreign trade between Europe and the waters of the James river, is already sufficient to give lucrative employment to two steamers of fifteen hundred tons burden each. Add to this the travel which a steamship line between Norfolk and Europe would secure, and the increase of transportation that it would certainly stimulate into being, and it is evident that the proposed enterprise would be a successful and profitable one.

Virginia.

Seaboard and Roanoke Railroad.—We learn from the Norfolk Herald that this work has been completed in the most substantial and superior manner to its junction with the Petersburg railroad, at Gray's, and is now within two miles of the Roanoke at Weldon Bridge. As the company have all the materials of iron and timber in place, these two miles will be finished in a few weeks.

South Side Railroad.—This work is completed about six and a half miles from its commencing point in this city, and is progressing fairly. We took a ride on it a day or two ago, and were very much pleased with the style of its execution. It will no doubt be one of the most agreeable roads for travellers, when finished, in the United States. The rails and timbers are of the very best description, and laid down very securely. The motion of the cars will be smooth and easy—free from all the roughness and harshness which are experienced on some of the roads of the country, and which are so unpleasant to passengers. The company have just commenced the erection of a spacious depot on their fine lot opposite the market house, which will be a great improvement to that part of the city.—They are also constructing a turning platform, upon a new and superior plan, by which the management of a locomotive upon it will be greatly simplified.—*Petersburg Intelligencer.*

Indiana.

Indianapolis and Peru Railroad.—We learn from the Indianapolis Journal, that the section of this road from Noblesville to Peru, the Northern terminus, has been awarded to contractors, who will shortly be on the ground with their hands and implements. The New York company that have undertaken to complete it have arrived, and are determined to push the work on to completion with all possible speed. It is the calculation to have it completed by the 1st of November, 1852.

Indiana.

Lawrenceburgh and Upper Mississippi Railroad.—At a meeting of the stockholders of this company, held at Greensburgh on the 1st inst., the following officers were elected for the ensuing year:—President, George H. Dunn; Secretary, William G. Dunn; Treasurer, Columbus S. Sevenson; Directors, George H. Dunn, David Nevitt, Walter Hays, of Lawrenceburgh; James B. Foley, Samuel Bryant, James Hamilton, Greensburg; —— Marshall, Milford; David Lovett, St. Omer; James M. Ray, Indianapolis.

Ohio.

Central Ohio Railroad.—The board of directors of this company for the ensuing year, as elected by the stockholders at their recent meeting on the 26th ult., are as follows: John H. Sullivan, S. R. Hosmer, James L. Cox, Edward Ball, Wm. Galliher, Daniel Brush, George James, Thomas Maxfield, Levi Claypool, Wilson Shannon, Thomas Blanchard, George B. Wright, Wm. Dennison, Jr.

At a subsequent meeting of the directors, J. H. Sullivan, Esq., was re-elected President, Daniel Brush, Treasurer, and Samuel J. Cox, Secretary.

Thomas Maxfield, Esq., having declined serving on the board of directors, the vacancy will be filled hereafter.

Cincinnati, Hamilton and Dayton Railroad.—This road will soon be ready for the cars. The distance to Dayton is 50 miles, and the fare is fixed at $1 50. It is supposed that it will be in operation before the close of the present month. The design of the board of directors is to finish the road if possible, before any portion is opened for travel.

Stock and Money Market.

We notice but slight variation in the money market. This commodity still commands very high rates; and, except what is absolutely necessary for ordinary business purposes, can with difficulty be obtained, even upon first class paper. Bonds of new works, if disposed of at present, must be sacrificed. All attempts to negotiate securities under existing circumstances will, we are convinced, prove abortive. The present scarcity of money, together with the uncertainty of the future, prevents any new engagements being entered into. The present nominal quotations of bonds of new roads, are no criterion by which to judge of their market value. We trust, however, that the crisis is at least at hand, if not already past; though, from the lateness of the season, it is doubtful whether much, if any change for the better will take place. A large amount of money is absorbed in the fall business. The shipments of specie have been unusually large the past week.

The Evening Journal gives the annexed statement of the quantity of flour, wheat, corn and barley, left at tide water during the 1st week in September in the years 1850 and 1851, as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley. bush.
1850...	90,120	129,771	104,073	43,946
1851...	72,877	74,343	132,523	45,950
Dec	17,243	55,428	Inc. 28,450	2,004

The aggregate quantity of the same articles left at tide water from the commencement of navigation to the 7th Sept., inclusive, during the years 1850 and 1851, is as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley. bush.
1850...	1,247,327	841,565	2,592,285	203,676
1851...	1,883,732	1,432,046	5,418,270	177,563
Inc....	636,405	590,481	2,825,985	dec.26,113

The aggregate quantity of the same articles left at tide water from the commencement of navigation to the 7th Sept., inclusive, during the years 1849 and 1851, is as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley. bush.
1849....	1,421,339	995,034	3,759,897	111,044
1851....	1,883,732	1,432,046	5,418,270	177,563
Increase.	462,393	437,012	1,658,373	66,519

By reducing the wheat to flour, the quantity of the latter left at tide water this year, compared with the corresponding period of last year, shows an increase of 754,501 bbls. of flour.

Cleveland, Columbus and Cincinnati Railroad.—The receipts of this road from passengers were, for

August	$38,557 26
July	35,827 67
Increase	2,729 49
Passengers and freight(partly estimated)	61,000 00
July	51,600 00
Increase	9,400 00

Columbus and Xenia Railroad.—The receipts of this road from passengers were, for

August	$14,907 06
July	14,119 55
Increase	787 51

The total receipts in August were, $21,700.

Rutland and Burlington Railroad.—The earnings of the Rutland and Burlington railroad for the month of August, were as follows:

Passengers and mail	$17,113 47
Freight	18,340 00
	35,453 47
Same month last year	22,919 97
Gain—about 55 per cent	12,533 50

Michigan Central Railroad.—The earnings of the Michigan Central road for August were:

1851	$98,000
1850	78,000
Increase—over 25 per cent	20,000
The aggregate earnings for the first eight months of the year are	$650,000
Same time last year	468,000
Increase—nearly 40 per cent	182,000

Little Miami Railroad.—The receipts on the Little Miami railroad from the 25th to 31st August, were $11,821 36
For corresponding week last year 8,836 74
Increase—30 per cent 2,984 62

Norwich and Worcester Railroad.—The receipts for the month of August were:

	1851.	1850.
Through travel	$1,811 42	$1,299 17
Local "	10,831 04	12,070 17
Freight	13,528 65	11,277 18
Mail, etc	1,051 46	1,814 16
	27,022 57	26,466 68

Louisville and Frankfort Railroad.—The receipts upon this road for August were as follows:

From passengers	$7,697 05
From freights	3,292 64
From mails	541 66
	11,531 35

This shows an increase upon July of 11 per cent from passengers, and over 200 per ct. from freight.

Ohio and Pennsylvania Railroad.—The number of passengers conveyed over the finished portion (28 miles) of the Ohio and Pennsylvania railroad last week was 3,107; cash receipts $1,662. This is the largest amount of passenger traffic we remember to have ever known under similar circumstances, and over a like length of new road.

Rutland and Washington Railroad.—The earnings of the ten finished miles of the Rutland and Washington railroad, from Rutland to Castleton, for July and August show a large increase over previous months. The earnings were $5,415, which gives about 7 per cent. net on the cost of the road.

The earnings of the Madison and Indianapolis railroad for the week ending Sept. 6th, were $7,600
Same week, 1850 4,750
Increase, 60 per cent $2,850

Virginia Central Railroad.—The Virginia Central railroad company shows an increase of the receipts for the six months from the 1st of January, 1851, over the same months of preceding year of $34,948 41.

Auburn has voted 810 out of 846 to lend its credit for $300,000 to the Auburn and Binghamton railroad.

The annual tables of the trade and navigation of Canada for 1850, show the total imports to have been $16,981,068, of which $6,594,860 were from the United States. The exports amounted to $10,679,992, of which $4,951,256 were to the United States.

Annexed is a comparative statement of the net receipts of tolls upon the Ohio canals from Nov. 15 to Aug. 15, in the years 1849-50 and 1850-51:

	1850.	1851.
Ohio canal	$190,307 09	$250,681 05
Marion and Erie canal	171,655 07	180,420 37
Muskingum Improvement	23,285 19	28.610 45
Hocking canal	4,282 70	6,878 90
Walhelding canal	742 57	1,521 73
	$399,272 62	$468,112 50
		399,272 62
Amount of increase in 1851		$68,839 88

Railway Share & Stock List;

CORRECTED WEEKLY FOR THE

AMERICAN RAILROAD JOURNAL.

NEW YORK SEPTEMBER 13, 1851.

GOVERNMENT AND STATE SECURITIES.

U. S. 5's, 1853	100¾
U. S. 6's, 1856	105½
U. S. 6's, 1862	110
U. S. 6's, 1862—coupon	113a114
U. S. 6's, 1867	115½
U. S. 6's, 1868	116
U. S. 6's, 1868—coupon	123⅞
Land Warrants	140a145
Arkansas 6's	52a53
Alabama 5's	91a92
Indiana 5's	79
Illinois 6's, 1870	65a68
Kentucky 6's, 1871	105a106
Massachusetts sterling 5's	105a106
Massachusetts 5's, 1859	100½
Maine 6's, 1855	103
Maryland 6's	102½
Michigan	——
Mississippi	——
New York 6's, 1865	117a118
Ohio 6's, 1860	110
Pennsylvania 5's	91

RAILROAD BONDS.

Atlantic and St. Lawrence, 6 per cent	85
Baltimore and Ohio, 1867	94¼
Boston and Providence 6's, 1855	101
Boston and Worcester 6's, 1855, convertible	107½
Bost., Concord and Mont. 6's, 1860, mortgage	87½
Cheshire 6's, 1860	91½
Connecticut River 6's, convertible	98
Erie 7's, 1859	101
Erie 7's, 1868	107½
Erie income 7's	91
Hudson River 7's, 1853	101½
Michigan Central, convertible, 8's, 1856	104½
New York and New Haven	100½
Norwich and Worcester, mortgage, 1860	80a85
Old Colony, 1854	97½
Ogdensburg 7's, 1859	91½
Portsmouth and Concord	80a85
Passumpsic 6's, 1859	94½
Rutland 7's, 1863	97
Reading mortgage, 1860	80
" " 1870	75
Sullivan, mortgage 6's, 1855	75
Vermont Central 6's, 1852	96½
" " 6's, 1856	88
Vermont and Massachusetts 6's, 1855	86½

RAILROAD STOCKS.

[CORRECTED FOR WEDNESDAY OF EACH WEEK.]

	Sept. 3.	Sept. 10.
Albany and Schenectady	96¼	—
Atlantic and St. Lawrence	60a65	—
Androscoggin and Kennebec	30a35	—
Boston and Maine	102	104¼
Boston and Lowell	109	109
Boston and Worcester	101	100¾
Boston and Providence	84¼	87
Bost., Concord and Montreal	40	—
Baltimore and Ohio	71¼	—
Baltimore and Susquehanna	36	—
Cheshire	53	—
Cleveland and Columbus	—	—
Columbus and Xenia	—	—
Camden and Amboy	—	—
Connecticut River	60	—
Delaware and Hudson (canal)	—	—
Eastern	95	96
Erie	77¼	78
Fall River	92½	92½
Fitchburgh	108¼	108¼
Georgia	—	—
Georgia Central	—	—
Harlem	69	68¼
Hartford and New Haven	124	—
Housatonic (preferred)	52	—
Hudson River	72	71¼
Kennebec and Portland	50a55	—
Little Miami	—	—
Long Island	15	14¼
Mad River	—	—
Madison and Indianapolis	96	—
Michigan Central	104¼	104
Montgomery and West Point	—	—
Michigan Southern	—	—
Manchester and Lawrence	97	89
Morris (canal)	14¼	15½
New York and New Haven	107	106½
New Jersey	133	—
Northern	66	66¼
Nashua and Lowell	107½	—
New Bedford and Taunton	111	—
Norwich and Worcester	51½	49¼
Norfolk County	20	—
Ogdensburgh	34	33½
Old Colony	66	66
Passumpsic	80	—
Pennsylvania	—	—
Pittsfield and North Adams	95	—
Philadelphia, Wilm'gton & Balt.	28	29
Petersburg	—	—
Richmond and Fredericksburg	—	—
Richmond and Petersburg	—	—
Reading	—	55¼
Rochester and Syracuse	107	106¼
Rutland	53	45¼
Stonington	43¼	42¼
South Carolina	—	—
Syracuse and Utica	123	—
Sullivan	25	—
Taunton Branch	108	—
Troy and Greenbush	90	—
Tonawanda	—	—
Utica and Schenectady	130	—
Vermont and Canada	103	99¼
Vermont Central	34	35½
Vermont and Massachusetts	25½	27
Virginia Central	—	—
Western	102½	102½
Wilmington and Raleigh	—	28½
York and Cumberland (Pa.)	20	—

Pennsylvania.

Bridge across the Conemaugh.—The Johnstown [Pa.] Mountain Echo says,—The Iron Bridge upon which the Pennsylvania railroad crosses the Conemaugh river at this place, is a structure well worthy of notice. The bridge is 380 feet in length, with five spans of 76 feet each, and two truss frames in each span of 7 1-2 feet high. Each span is divided into 18 panels, 16 of which are four feet and the other two four and a half feet long, leaving at each end panels of one and a half feet. Each panel has one main brace of one and a quarter, and two counter braces of one and a half round iron, well secured at the top and bottom to angle blocks by

large nuts. The upper cord or cast piece is made of cast iron, in lengths of twelve feet, the area, a section of the chord, being fifteen and a half inches. The lower chord is made of four bars of wrought iron, each three quarters—six and a half inches lying edgewise one and a half inches apart. The arches are of cast iron, and are secured to the posts in each truss-frame by strong bolts. The arches weigh fifteen tons. Its capacity for sustaining immense weight may be judged from the fact that a locomotive weighing twenty-five tons, standing on the centre of a span, caused it to yield only 15-1000 of a foot. This bridge has been pronounced by competent judges to be the most beautiful structure in the world.

For the American Railroad Journal.

Cincinnati and Seaboard Railways.-No. III.

H. V. Poor, Esq.

Sir,—Of the nine railway routes, or modifications of routes, now directed upon the city of Cincinnati, from the seaboard, and through that city to St. Louis, by the Ohio and Mississippi railway, (325 miles in length) all will gain the Ohio river, with a gauge of 4 feet 8½ inches width from iron to iron.

The New York and Lake Railways, though ultimately reaching Cincinnati, do not, as has before been explained, come within the scope of these articles.

Arrived at the line of the Ohio River, all the rival routes herein referred to, (excepting one) have such interior connexions, or legal obligations, as will require their gauges to be changed to the Ohio state gauge of 4 feet 10 inches; that one is the Baltimore and Ohio railroad, which may soon run on through Cincinnati to St. Louis, by properly availing of the aid of other companies, *with an unbroken gauge.*

Arrived at Cincinnati, the further progress westward of the business of all these Eastern lines must be by a movement upon the state gauge of Indiana, 4 feet 8½ inches, the same upon which they left the sea-coast; and this necessarily produces two breaks of gauge, between the Mississippi and the sea.

The gauge of Ohio then, by the gauge of her general laws, 4 feet 10 inches, and its adoption by all but one of her railway corporations, presents a barrier to the extension of the Eastern railway system, over her territory, and imposes the necessity of two portages or breaks of gauge, upon all through lines from East to West, with the single exception to which we have refefred.

During the long pending examination of this subject, before the gauge commission of the British parliament, it seems to have been admitted, that every break of gauge, was at least equivalent to a ferry interposed in the line.

But this typical view of the question had reference principally to a passenger business, or to the transportation of troops, and munitions of war.

Upon a heavy freight business the practical effect of a break of gauge, is less easily estimated, and not yet known in this country by experience, in uniting great railways of adverse gauges, and prolonging through them a large freight business, such as Western and Seaboard railways in the United States have reason to expect.

When it is recollected that the breaks of gauge usually occur where the goods, *in transitu*, will pass from the custody of one corporation to another, the difficulty will evidently be augmented; as that fact will render necessary a double registration of the articles, when unpacked from the cars of the one, and repacked in the cars of the other, in order to fix definitely the responsibility of loss, or breakage, upon the proper parties.

This breaking bulk, this handling, this inspection, this double registration by a clerical force of both companies, and the final repacking in the cars of the receiving company, cannot reasonably be expected to consume less time on the average, than one day, between the arrival and departure of the freight trains on either side of the break of gauge.

This simple hypothesis will give us a practical estimate of the effects of a break of gauge, upon the goods business of a railway, and of its measure in equivalent distance—which we cannot be far wrong in estimating *at one days' run of the freight train, lost by every break of gauge.*

The cost of unpacking and repacking, at each break of gauge, will also be considerable, probably, at least, a half dollar per ton; but it is not our intention at present to enter upon that branch of the subject.

Twenty-four hours' run of a modern freight train upon a railroad, cannot fairly be estimated at less than *three hundred miles.* And this, then, is the measure, in equivalent distance, of the effect of a single break of gauge, upon the freight business of a railroad line.

The loss of time caused to the passenger business by a break of gauge—involving shifting cars, changing baggage, &c.,—may be estimated at about half an hour lost, or, in equivalent distance, say, *fifteen miles.*

The Baltimore and Ohio railroad company, by availing themselves of the independent charter* existing in Southern Ohio, have the ability to obtain an unbroken gauge, through Parkersburgh and Belpre, directly into the city of Cincinnati, and thence through the Ohio and Mississippi railroad, (of 4 feet 8½ inches gauge) westward to the banks of the Mississippi river, opposite the city of St. Louis.

The gauge of 4 feet 8½ inches, capable of being thus brought out to the west *continuously and unbroken* from the Seaboard, through Baltimore, and connecting at that city with the numerous sea-coast railroads, running north and south by the same gauge,—from Maine to Carolina—would give to that great artery of business, an importance it would not otherwise possess—an importance far transcending the pretensions of any of the rival lines from the seaboard to the western country.

Now, supposing the Baltimore railroad line to be prolonged through Cincinnati to St. Louis, *with an unbroken gauge*, it would have an advantage over the competitor lines—all of which require at least two breaks of gauge,—and this advantage, in equivalent distance, may be estimated *at thirty miles in the passenger business, and six hundred miles in the carriage of freight.*

This line, at the highest estimate of its length, even when measured from the point of Philadelphia to Cincinnati, being but a few miles longer than its shortest rival—and as all those rivals must encounter two breaks of gauge—the immense superiority that an unbroken gauge would give it, over all the other Cincinnati and Seaboard railways, must, we think, be evident to all disinterested men.

From the port of Baltimore many articles of western produce can be shipped, both foreign and coastwise, and many of western consumption can come by the sea, with as much advantage as any city on the Atlantic coast can offer.

Add to this the physical fact, that the far reaching inland sweep of the waters of Chesapeake Bay, brings the Atlantic tide at Baltimore, nearly one hundred miles nearer the centre of western commerce than at any other seaboard port, and the commanding position of that city, and the leading importance of her railway west, must be evident to a demonstration.

Consequently, amongst all the Cincinnati and Seaboard railroads discussed in these brief articles, it seems to the writer, (who has no special interest in any) that the Baltimore and Ohio Railroad, if extended to Cincinnati and to St. Louis, without breaking its gauge, will far surpass its rivals in the business it will do, and in the benefits it will confer upon our common country.

Diagonal.

* The existence of this charter has lately been denied by a partizan of the Hempfield line,—but nevertheless, it may be found on the statute book of Ohio,—it will be availed of by the proper parties, at the proper time, and will be found quite sufficient for its object.

Ohio.

Central Ohio Railroad Company.—We have received the third annual report of the president and directors of this company, from which we gather the following facts:—In May, 1850, twenty-four sections of the route from Zanesville to Newark, were let to contractors, and in the November following, the remainder of the line to Columbus was also placed under contract. The work has made good progress since that period. Section 13, with an embankment of about 60,000 cubic yards, is now being finished up for final estimate. Section 17, embracing the heavy cut through the "Black Hand Rock," as it is called, was commenced on the 4th of July, 1850, and in just twelve months from that day the cut was carried through the rock. This work is probably the most imposing in Ohio, being a cut of about 700 feet in length and 64 in depth at the deepest place, of solid rock. This section cost about $3000 less than was estimated at the letting, and under an improved line. Several sections west of Newark are of a very heavy character; one embracing an embankment of 246 000 cubic yards.—There is probably no other section in Ohio of half the amount of work of this.

With the exception of the bridge across the North Fork of Licking, the whole road between Zanesville and Newark, with ballasting on, will, within a few days, be ready for the rail. If the iron be received in due season, the chief engineer confidently hopes to have it laid, and the road in operation between Zanesville and Newark in the month of October next. And with the exception of two sections, the remainder of the line to Columbus is in a state of forwardness that is very satisfactory—some 18 miles being already complete; and the whole is expected to be ready for operation on or about the first day of April next.

A portion of the rail purchased in England has arrived in this country, and is on its way from New York to Zanesville.

In December last, the president was instructed to issue $450,000 of the mortgage bonds of the company and with the avails of their sale procure the rails and equipment necessary for the western division of the road. He succeeded in disposing of them on terms very satisfactory to the board.

These bonds were issued on the first of February last; have 10 years to run from that date, interest payable semi-annually in New York. The mortgage covers only the portion of the road between Zanesville and Columbus.

The president also sold to the same parties who purchased the company bonds, $180,000 of bonds issued to the company by the counties of Muskingum and Licking, and the city of Zanesville. These brought 92 per cent., a higher rate than has been obtained for similar securities, in large amounts, up to that time or since.

Under instructions of the board, surveys were commenced upon the various routes between Zanesville and Wheeling that had been indicated as available. The surveys were interrupted by the refusal of Belmont county to make the subscription of $100,000 called for. The complexion of the question in that county has been materially changed since then; and with a persuasion that she would do her share of the work, an order has been given for the recommencing the survey. The three parties ordered will be placed in the field immediately.

The amount of the stock promised in Franklin county, although not all formally subscribed, is provided in part by reliable individual subscriptions to the extent of near forty thousand dollars, with a formal obligation upon the part of the Columbus and Xenia railroad company, to subscribe the balance of the $100,000 asked of that county. This obligation of the Columbus and Xenia railroad company is to be available before the completion of the road to Columbus. It is accompanied with a counter obligation on the part of the Central company to take an equal amount of stock in their road, to be made available before the completion of the extension to Dayton.

The following is the present condition of the affairs of the company :—

Whole amount of stock subscribed	$508,600 00
Whole amount of stock paid in	306,643 70
	$201,956 30
Amount paid for construction including cross ties	$192,531 62
Engineering expenses locating western division, including instruments	11,141 10
Engineering, eastern division	3,680 84
Right of way	6,731 78
Machinery	10,986 72
Depot and machine shop grounds	3,050 35
Machine shop buildings	950 18
Wood	221 86
Salaries	4,324 19
Contingencies	1,489 70
Office furniture	188 08
	$235,296 40
Apparent balance of cash on hand	71,347 30
	$306,643 70

The reason for stating the apparent balance is that the nature of the understanding with the counties and towns subscribing, is of rather a complex character, and the true balance can not be struck until the settlement of the bond account with those parties; and this can not well be done until the whole of the proceeds of the bonds are drawn for, and the question of interest, discount and exchange adjusted.

Wisconsin.

Milwaukee and Mississippi Railroad.—Twenty miles of the Milwaukee and Mississippi railroad, west from Milwaukee, have been completed, and are now in operation, and in three months time about eighteen miles more will be finished. The length of this road will be about 200 miles, and the cost, with a heavy T rail, so far as constructed, is only about $12,000 per mile. The authorised capital of the company is $3,000,000, of which nearly $1,000,000 has been subscribed by the people of Wisconsin.

Hillsborough, Sept. 2nd, 1851.

Dear Sir,—In your paper of August 23d, an article signed "Philadelphia," on the Hempfield and Marietta connection with Cincinnati, versus the Baltimore and Parkersburgh railroad connection with the same, attracted not only my attention but my admiration. "Philadelphia," no doubt, is an educated book engineer, of the first class, as he deals largely in the sophisms of the profession, and to some extent enlarges the facts, when necessary to sustain his position of the latter. I shall only notice one of his extravagant assertions, based no doubt "on the information of some unscrupulous friend of his favorite route." He asserts there is no such charter for a direct road from Parkersburgh to Cincinnati, as Baltimore alludes to—that the Hillsborough charter precludes the company from such a route, and under the new constitution of Ohio no charters will be granted. I am happy to inform Mr. "Philadelphia," that we have all we want as to charter, and that a road will be built under our charter, direct from Parkersburgh to Cincinnati, on a route from ten to fifteen miles shorter than any route heretofore projected, and to satisfy the fastidious on this subject of charter, I request you to publish the following.

Yours, &c.,

PARKERSBURGH.

—

AN ACT

To amend an act entitled "an act to incorporate the Hillsborough and Cincinnati railroad company."

SEC. 1. *Be it enacted by the General Assembly of the State of Ohio,* That the Hillsborough and Cincinnati railroad company shall have the power, and is hereby authorized to extend its road to the city of Marietta, and from thence to any point above the mouth of the Muskingum on the Ohio river, and to cross the same, to cross or join any other railroad, to construct a branch to Greenfield, Frankfort and Circleville, or either of them, and any other branch or branches deemed necessary by the company—in all which cases the said company to enjoy all the privileges and be limited by the restrictions contained in the original charter.

Sec. 2. That the capital stock of the Hillsborough and Cincinnati railroad company be, and the same is hereby increased to five millions of dollars.

Sec. 3. So much of the act to which this is an amendment as conflicts with the act be, and the same is hereby repealed.

JOHN F. MORSE,
Speaker of the House of Representatives.
CHARLES C. CONVERS,
Speaker of the Senate.

March 12, 1851.

—

Secretary of State's office,
Columbus, March 13, 1851.

I hereby certify the foregoing to be a correct copy of the original roll on file in this office.

HENRY W. KING,
Secretary of State.

Railroad Subscriptions.

Jackson township, in Muskingum county, Ohio, on the 29th ult., decided to take stock in the Steubenville and Indiana railroad company, to the amount of $20,000.

Somerset township, in Perry county, Ohio, has subscribed $23,000 to the Cincinnati, Circleville and Zanesville railroad.

Athens county, Ohio, has voted a second $100,000 to the capital stock of the Marietta and Cincinnati railroad. The citizens of Chillicothe have also voted, by a large majority, an additional subscription of $50,000 to the same road.

The city of Cincinnati has appropriated $600,000 to the Ohio and Mississippi railroad company, and $100,000 to the Covington and Lexington railroad.

Gauge of Railroads.

We are permitted to publish the following letter from the acting manager of one of the most extensive locomotive machine-shops in the country.

The discussion of the proper gauge for a railroad, although of no practical application in the Eastern States, is important to the extreme Western States, many of which are by their position, entirely disconnected from other railroads :—

PATTERSON, NEW JERSEY,
August 6th, 1851.

H. C. SEYMOUR, Esq., Chief Engineer of the State of New York, Albany. N.Y.

Dear Sir,—Your favor of the 4th inst. is received and contents noticed respecting different gauges, &c.

I was at one time, some years ago, of opinion that a narrower gauge than five and a half feet [5½ ft.) was preferable: at that time engines were much smaller, and run at a much less speed than at the present time. On account of the increased size of engines for freight, and the increased speed and size of passenger engines, we find great difficulty in putting in a boiler sufficiently large to generate steam to supply cylinders of a sufficient size to run the speed that is required, and take the load required.

There is another serious objection to a four feet eight and a half inch (4 ft. 8½ inch) gauge; and that is, to arrange the different parts of the engine properly without raising the boiler much higher from the track than is desirable.

I have found in many cases, when we have built large engines for a narrow gauge, we have been compelled to make the boiler and flues very long; and on account of the great length of the flues, the expansion and contraction of the flues has been so great that it has been impossible to keep them tight, which is a very serious objection.

I have built engines for roads from four feet eight and a half inches (4 ft. 8½ inches) gauge to seven feet [7 feet] gauge, and I am satisfied that a six feet [6 ft.) track is preferable to a four feet eight and a half inch [4 ft. 8½ inch], or a five feet track. I consider a five and a half feet [5½ ft.] gauge preferable to a six feet (6 ft.) gauge.

A five and a half feet [5½ ft.] gauge is sufficiently wide to put in a boiler of proper dimensions, and also to arrange all the different parts of an engine as heavy as is desirable.

We have engines in our shop at the present time building for six feet (6 ft.), four feet eight and a half inches (4 ft. 8½ in.), and five feet four inches (5 ft. 4 in.) gauge; and I think the five feet four inches (5 ft. 4 in.) gauge is preferable to either of the other gauges, and I think two inches more, making it five and a half feet (5½ ft.), would be no objection. I am decidedly in favor of a wider gauge than four feet eight and a half inches (4 ft. 8½ in.)

There is another serious objection to a narrow gauge, the being compelled to raise the engine so high from the track, that in going round a curve it causes the engine to roll much more than it would if it was a wider gauge; in consequences of which it throws more weight on the outer rail which increases the friction and wear and tear of the engine and road, more than the wide gauge, and causes a loss of power at the time when the greatest power is required to take the engine and train around the curves. I think you would be able to take a much heavier train over a road of five and a half feet [5½ ft.] gauge, than you would over one of four feet eight and a half inches [4 ft. 8½ in.]

I also think that it would cost less to keep the track with the wide gauge in repair than it would the narrow one, on account of the weight of the engine and cars being more equally divided on the rails,

Very Respectfully, yours, &c., *

Pennsylvania.

Catanissa, Williamsport and Erie Railroad.—We learn from the Miner's Journal that the work on this road is rapidly progressing, under the supervision of Richard Osborne, Esq., Chief Engineer. The grading, in all probability, will be so far completed this fall as to enable them to put down a portion of the track, and undoubtedly the whole road will be completed in a year from the present time.

Maine.

Buckfield Branch Railroad.—At the annual meeting of the stockholders of the Buckfield Branch railroad, holden on the 30th ult., the following gentlemen were chosen directors:—Virgil D. Parris, Cyrus Thompson, Noah Prince, Ira Gardner, Washington Long, Albert D. White, Aaron Parsons, Moses Marshall and Calvin Bridgham. At a subsequent meeting of the directors, Virgil D. Parris was unanimously elected president.

Iowa.

Dubuque and Keokuk Railroad.—Mr. Eaton, the present Engineer-in-chief of the Dubuque and Keokuk railroad North, organized a surveying party on the 2d inst., and proceeded to locate the route from Dubuque westward, to the point where the first location was made permanently, by resolution of the board of directors. It is the intention of the directors, to put a portion of the work under contract this fall, and to push the construction of the road onward towards Cedar Rapids, with energy and spirit.

Illinois.

Peoria and Mississippi Railroad.—Upon a careful survey by the engineer of the old road from Peoria to Farmington, which was purchased by this company from the state of Illinois, it has been discovered that a portion west of the Kickapoo, for a distance of nearly three miles, had an ascending grade of one hundred feet to the mile. This unexpected result renders the use of that road extremely doubtful. The board of directors held a meeting at Peoria recently, and adjourned to meet at Knoxville on the 3d of October. In the mean time the survey will be vigorously prosecuted at Knoxville, and the route from Knoxville to Burlington will be carefully examined by the engineer, so that he will be able to lay before the board, at its next meeting, a full report of the probable cost of the entire road. The board, in the expectation that the friends of the road will meet the emergency, have advertised for proposals for the bridges and grading of the eastern division of the road.

Railroad Route.—From a source entirely reliable, we learn that the board of directors of the Central railroad company, at their meeting in New York, on Thursday of last week, decided that the Northern route, by the way of Scale's Mound, should be adopted in the approach of this great work to Galena!

We are now able to congratulate the citizens of Galena on the prospective realization of the hopes they have so long entertained. The prosperity of the city is now secured! No change or combination of circumstances (the railroad being built) can prevent its growth. Galena will, in five years, number 15,000 people. We hazard the conjecture, not under the influence of the momentary excitement produced by this intelligence, but as the result of a long entertained and deliberate conviction!

In the location of the Eastern branch, the directors have decided to run along the Eastern line of the state, to make a junction with the Michigan Southern road, as near as possible to the Western boundary of Indiana. Within the next ensuing nine months, one hundred miles of the upper part of the Eastern branch, will be constructed. That branch leaves the main trunk, at or near Vandalia. —*Galena Jeffersonian.*

Steam Boilers, and the Causes of their Explosions.

The following is an abstract of a lecture delivered in Leeds, England, by W. Fairbairn, Esq., C.E., F.R.S., on the causes of the explosion of steam boilers, and the remedies applicable for the prevention of these accidents. He endeavors to show not only what *are* the probable causes of explosion, but also what *are not* the causes. So many theories, some of them exceedingly problematical, have been brought forward on the occasion of disastrous explosions, that it requires the utmost care and attention to circumstances to arrive at the real origin of the evil. To acquire satisfactory evidence as to the precise condition of the boiler and furnaces before an explosion is next to impossible, as most frequently the parties in charge, and to whose mismanagement and neglect may in many instances be ascribed the origin of the occurrence, are the first to become the victims of their own indiscretion; and we can only judge from the havoc and devastation that ensues, as to the immediate cause of the event.

In the consideration of this subject, Mr. Fairbairn mentions—

1st. *Boiler explosions arising from accumulated internal pressure.*—In nine cases out of ten a continuous increasing pressure of steam without the means of escape is probably the immediate cause of explosion; in some instances it arises from deficiency of water, but accidents of this kind are comparatively few in number, as we often find in tracing the causes, that they have their origin in undue pressure, emanating from progressive accumulation of steam of great force and intensity.—Let us take an example—to some of which I am able to refer—and we shall find that a boiler under the influence of a furnace in active combustion (as the recipient of heat) will generate an immense quantity of steam, and unless this is carried off by the safety valve or the usual channels when generated, the greatest danger may be apprehended by the continuous increase of pressure that is taking place within the boiler. Suppose that from some cause, the steam thus accumulated does not escape with the same rapidity with which it is generated, that the safety valves are either inadequate to the full discharge of the surplus steam, or that they are entirely inoperative, which is sometimes the case, and we have at once the clue to the injurious consequences which, as a matter of fact, are sure to follow. The event may be procrastinated, and repeated trials of the antagonist forces from within, and the resistance of the plates from without, may occur without any apparent danger, but these experiments often repeated will at length injure the resisting powers of the material, and the ultimatum will be the arrival of the fatal moment when the balance of the two forces is destroyed and explosion ensues. How very often do we find this to be the true cause of accidents arising from extreme internal pressure, and how very easily the accidents might be avoided by the attachment of proper safety valves to allow the steam to escape and relieve the boiler of those severe trials which ultimately lead to destruction. If a boiler, whose generative power be equal to 100, be worked at a pressure of 10 lbs. on the square inch, the area of the safety valves should also be equal to 100, in order to prevent a continuous increase of pressure; or in case of the adhesion of any of the valves, it is desirable that their areas should, collectively, be equal to 100. If two or more valves are used, 100 or 120 would then be the measure of outlet. Under these precautions, and a boiler so constructed, the risk of accident is greatly diminished; and provided one of the valves is kept in working order, beyond the reach of interference by the engineer, *or any other person*, we may venture to assume that the means of escape are at hand, irrespective of the temporary stoppage of the usual channels for carrying off the steam. So many accidents have occurred from this cause—the defective state of the safety valves—that I must request the attention while I enumerate a few of the most prominent cases that have come before me. In the year 1845, a tremendous explosion took place at a cotton mill in Bolton. The boilers, three in number, were situated under the mill, and from unequal capacity in the safety valves, and even those imperfect, as they were probably fast, a terrific explosion of the weakest boiler took place, which tore up the plates along the bottom, and the steam having no outlet at the top, not only burst out the end next the furnace, demolishing the building in that direction, but tearing up the top on the opposite side, the boiler was projected upwards in an oblique direction, carrying the floors, walls, and every other obstruction before it; ultimately it lodged itself across the railway at some distance from the building. Looking at the disastrous consequences of this accident, and the number of persons—from 16 to 18—who lost their lives on the occasion, it became a subject of deep interest to the community that a close investigation should immediately be instituted, and a recommendation followed that every precaution should be used in the construction as well as the management of boilers.

The next fatal occurrence on record in that district was a boiler at Ashton-under-Lyne, which exploded under similar circumstances, namely, from excessive interior pressure, when four or five lives were lost; and again at Hyde, where a similar accident occurred from the same cause, which was afterwards traced to the insane act of the stoker or engineer, who prevented all means for the steam to escape down the safety valve.

There was a boiler exploded at Malaga, in Spain, some years since, and my reason for noticing it in this place is to show that explosions may be apprehended from other causes than those enumerated in the divisions of this inquiry, and that is *incrustation*. Dr. Ritterbrandt says—in a paper read before the Institution of Civil Engineers, by an eminent chemist, Mr. West—"that a sudden evolution of steam under circumstances of incrustation is no uncommon occurrence;" in several instances I have known this to be the case, particularly in marine boilers, where the incrustation from salt water becomes a serious grievance, either as regards the duration of the boiler, or the economy of fuel.

It it were supposed, as Dr. Ritterbrandt observes, that the boiler was incrusted to the extent of half an inch, it would at once be seen that nothing was more easy than to heat the boiler strongly, even to red heat, without the immediate contact of water. Under these circumstances, the hardened deposits being firmly attached to the plates, and forming an imperfect conductor of heat, would greatly increase the temperature of the iron, and the great difference of temperature thus induced between the material —and the greater expansibility of the iron—would cause the incrustation to separate from the plates, and the water rushing in between them would generate a considerable charge of highly elastic steam, and thus endanger the security of the boiler.

These phenomena were singularly exemplified in the Malaga explosion, which is thus described by Mr. Hick—"I have ascertained that a very thick incrustation of salt was found on the lower part of the boiler, immediately over the fire, and so far as it extended the plates appear to have been red hot, thereby much weakened, and hence the explosion. The ordinary working pressure of the boiler is 130 lbs. per square inch, and perhaps at the time of the explosion very much above that pressure, as there was only one small safety valve of two and a half inches diameter. The boiler was only two feet six inches diameter, and twenty feet long."

Incrustation, exclusive of being dangerous, is attended with great expense and injury to the boiler by its removal. In the case of the Transatlantic, Oriental, or other long sea-going vessels—even after the use of brine pumps, blowing out, etc.—a very large amount of incrustation is formed, and considerable sums of money are expended each voyage to remove it.

Other expositions of a more recent date are those which occurred at Bradford and Halifax. They are still fresh in the recollection of the public mind, and are so well known as not to require notice in this place.

I cannot, however, leave this part of the subject, without reverting to an accident which occurred on the Lancashire and Yorkshire railway, which had its origin in the same cause—excessive internal pressure. This accident is the more peculiar as it led to a long mathematical disquisition as to the nature of the forces which produced results at once curious and interesting. The conclusions which I arrived at, although *practically right*, were, however, considered by some *mathematically wrong*, as they were firmly combatted by several eminent mathematicians; and notwithstanding the number of algebraic formulas, and the learned discussions of my friends on that occasion, I have been unable to change the opinion I then formed of others more conclusive.

The accident here alluded to, occurred to the Irk locomotive engine, which in February, 1845, blew up and killed the driver, stoker, and another person who was standing near the spot at the time. A great difference of opinion as to the cause of this accident was prevalent in the minds of those who witnessed the explosion, some attributing it to a crack in the copper fire-box, and others to the weakness of the stays over the top—neither of these opinions were, however, correct, as it was afterwards demonstrated that the material was not only entirely free from cracks and flaws, but the stays were proved sufficient to resist a pressure of 150 to 200 lbs. on the square inch. The true cause was afterwards ascertained to arise from the fastening down of the safety valve of the engine (an active fire being in operation under the boiler at the time) which was under the shed, with the steam up, ready to start with the early morning train.

The effect of this was the forcing down of the top of the copper fire-box upon the blazing embers of the furnace, which, acting upon the principle of the rocket, elevated the boiler and engine of 20 tons weight to the height of 30 feet, which, in its ascent, made a summerset in the air, passed through the roof of the shed, and ultimately landed at a distance of sixty yards from its original position. The question which excited most interest, was the absolute force required to fracture the fire box, its peculiar properties, when once liberated, and the elastic or continuous powers in operation, which forced the engine from its place to an elevation of 30 feet from the position on which it stood. An elaborate mathematical discussion ensued relative to the nature of these forces, which ended in the opinion that a pressure sufficient to rupture the fire box, was by its continuous action sufficient to elevate the boiler and produce the results which followed. Another reason was assigned, namely, that an accumulated force of elastic vapor, at a high temperature, with no outlet through the valves, having suddenly burst upon the glowing embers of the furnace, would charge the products of combustion with their equivalents of oxygen, and hence explosion followed. Whether one or both of these two causes were in operation, is probably difficult to determine; at all events we have in many instances precisely the same results produced from similar causes, and unless greater precaution is used in the prevention of excessive pressure, we may naturally expect a repetition of the same fatal results.

The preventives against accidents of this kind are well constructed boilers of the strongest form, and duly proportioned safely valves—one under the immediate control of the engineer, and the other, as a reserve, under the keeping of some competent authority.

To be continued

To Engineers.

A NEW WORK on the Marine Boilers of the United States, prepared from authentic drawings, and illustrated by 70 engravings, among which are those of the fastest and best steamers in the country, has just been published by B. H. Bartol, Engineer, and is for sale at the store of

D. APPLETON & CO.,
Broadway.

September 1, 1851.

To Contractors.

A DIVISION of about 30 miles of the grading, together with the mechanical works of the South Side Railroad, commencing near Farmville, and extending westward, will be let on the 15th of October next, at Farmville.

C. O. SANFORD, Chief Engineer.
Petersburg, September 4th, 1851.

Blake's Patent FIRE-PROOF PAINT.

This paint, in a few months after applied, turns to slate or stone, forming a complete enamel or coat of mail over whatever applied, protecting it from the action of fire, water or weather. It has now been tried over seven years, and where first applied is now like a stone.

LOOK OUT FOR FORGED BRANDS AND WORTHLESS COUNTERFEITS, as this paint has gained such universal credit throughout the country, that many persons have been getting up all kinds of worthless counterfeit stuff, and pushing it into the market upon the credit of the genuine, but most of it has proved itself so entirely worthless, that it is impossible to sell. Some of them have commenced forging my brands, and putting it upon the barrels—the forgery can be detected from the fact that on the genuine the words "Blake's Patent Fire Proof" are put on in a circular form, but on the spurious it is straight. I have now three suits in the United States Court against those who have been infringing my patent by selling "fire proof paint" not of my manufacture. I would, therefore, caution all to be very particular, and see that they get the genuine article, which can at all times be had of the Patentee, at 84 Pearl street, New York.

WM BLAKE.

September 12th.

Wanted,

BY the Montreal Mining Company, a Manager for their Establishment at the Bruce Mines, Lake Huron.

Applications stating terms, and enclosing certificates of character and ability, will be received by the undersigned until the 1st October next.

By order.
H. D. COCKBURN, Secretary.
Montreal, August 27, 1851.

To Contractors.

THE SUNBURY AND ERIE RAILROAD COMPANY invite proposals for grading and bridging the line of the road, for a double track, from the City of Erie to Williamsport, in Lycoming county, in a substantial and workmanlike manner, complete in every respect for the superstructure.

Proposals should be addressed to D. L. MILLER, Jr., President, Philadelphia, on or before the 20th of Ninth month (September) 1851. Contractors will state what proportion of the Stock of the Company, if any, they will take at par in payment.

It is believed that the superiority of the harbor of Erie, the favorable position of the route, and the shortness of the distance secured by this, compared with any other railroad from the Lakes to the seaboard, will render this road as profitable, and its stock as good an investment, as that of any ever constructed in the United States.

A copy of EDWARD MILLER'S Second Report will be forwarded to those to whom this Circular may be addressed.

A MASS CONVENTION of the friends of this great project will be held in the City of Philadelphia on the 25th of Ninth month (September), at which all interested are invited to attend. 3t36

To Contractors.

Cincinnati and St. Louis Railroad.

SEALED proposals will be received at the Office of the Company till Wednesday, the 1st day of October next, for grubbing, grading and bridging forty-five miles of the Ohio and Mississippi railroad, from Mill Creek, in Cincinnati, to a point twenty miles west of the city of Aurora, Ind.

Plans, specifications, &c., may be examined by Contractors, at the Office of the Company, in Cincinnati, from the 20th of September, to the day of letting.

By order of the Board,
ABNER T. ELLIS, Pres't.
Cincinnati, August 16th, 1851.

To Chief Engineers, Directors of Railroads, Canals, etc.

A Civil Engineer and Surveyor, who has been professionally engaged under the British Government, East India Company, etc., is desirous of obtaining employment as an Assistant. No objection to the South or West. Address for one month to C. E. & S., American Railroad Journal office.
August 16, 1851.

Railroad Iron.

THE Undersigned offer for sale 2,000 tons of Railroad Iron, to arrive at New York in the month of September next. It is of a most approved pattern and quality, and weighs about fifty-five pounds to the yard.

CHOUTEAU, MERLE & SANDFORD.
No. 51, New Street.
New York, August 9.

TO CONTRACTORS.

Belpre and Cincinnati Railroad.

Engineer's Office,
Chillicothe, July 30, 1841.

SEALED PROPOSALS will be received at the Engineer's Office, in Chillicothe, until the *18th day of September*, 1851, for the Graduation, Masonry and Bridging of 42 miles more of their road;—25 miles being between Greenfield and Blanchester, and 17 miles east of the 11 miles now under contract east of Chillicothe.

Plans, Profiles and Specifications will be ready for examination, at the Engineer's Office, on and after the 10th day of August. Blank Proposals will be furnished to Contractors, and all necessary information given upon the line or at the office concerning the quality and quantity of work.

W. P. CUTLER, Pre'st.
A. KENNEDY, Chief Engineer.

Virginia Locomotive and Car Works.

Wolfe Street and River Potomac, Alexandria, Va.
SMITH & PERKINS, *Proprietors.*

MANUFACTURE
Locomotive Engines and Tenders.
Marine and Stationary Engines and Boilers.
Chilled Car Wheels and Axles.
Patent Chilled and Wrought Slip-tire.
Machinery and Castings generally.

The undersigned having erected very extensive shops, and procured the most modern machinery and tools, are prepared to execute orders for Locomotive Engines, Cars, and Machinery of all kinds, with despatch, and on the most favorable terms.

R. C. SMITH,
Late of the Alexandria Iron Works.
THATCHER PERKINS,
Late Master of Machinery on the Balt. & O. R.R.
July 22, 1851.

Railroad Paint.

FOR depot buildings, bridges, burthen cars, wheels and axles, pipes, steam joints, fences, and every description of work requiring protection from the action of the elements. Price per barrel of 300 pounds, nine dollars.

Orders addressed to J. M. HALL, 36 South street, New York, will receive prompt attention.

CORROSIVE SUBLIMATE.

THIS article now extensively used for the preservation of timber, is manufactured and for sale by POWERS & WEIGHTMAN, manufacturing Chemists, Philadelphia.
Jan. 20, 1849.

Bridges & Brother,

DEALERS IN

RAILROAD AND CAR FINDINGS,

64 Courtlandt street, New York.

Having established a general Depot for the sale of articles used in the construction of Railroads, Locomotive Engines and Railroad Cars, we would invite your attention to our establishment. We have already in store a good assortment of CAR FINDINGS and other articles used in the trade, and feel justified in saying, that should you desire anything in our line, we can supply on terms perfectly satisfactory, and in the event of your desiring to order, you may feel assured that your terms will be as good as though you were here to make your own purchases.

Among our goods may be found Railroad Car Wheels, Axles, Jaws and Boxes, Nuts and Washers, Bolts, Brass Seat Hooks and Rivets, Window and Blind Springs, Lifters and Catchers, Door Locks, Knobs and Butts, Ventilators and Rings, Car Lamps, Coach and Wood Screws, Jack and Bed Screws and Babbitt's Metal; also Plushes, Damask, Enameled Head Linings, Cotton Duck for Top Covering in width sufficient without seams, Curled Hair and all other articles appertaining to cars.

Also a new and valuable CAR DOOR LOCK, well adapted to the Sliding Door. This is decidedly the best yet introduced.

LOCOMOTIVE ENGINE LANTERNS, the best article made in the country. Whistles, Gauge and Oil Cocks, Hemp Packing, American, Russian and Italian. We are also agents for Lightner's Patent Journal Box for Car Axles, that invaluable invention, for the economical use and preservation of Car Journals.

Coach VARNISH and Japan of the best quality.

We would also offer our services for the purchase as well as for the sale of goods on commission.—Both members of our firm have had the experience of many years in the manufacture of Railroad Cars, and our Senior was a member of the well known house of DAVENPORT & BRIDGES, Car Manufacturers, Cambridgeport, Mass. With our knowledge of matters pertaining to Railroads, we feel quite confident in giving satisfaction to both buyer and seller, and hope that through assiduity and attention to any business entrusted to our care we shall merit a continuance of confidence and patronage.

BRIDGES & BROTHER.

July 22, 1851.

Lightner's Patent Axle Boxes.

THE Undersigned are Agents for, and offer for sale, *Lightner's Patent Axle Boxes*, for Railroad Cars and Tenders, which have, by thorough experience, been demonstrated to be one of the most valuable improvements ever introduced in Locomotion. The saving effected in oil alone, will in a few months pay the first cost of these boxes, independent of other advantages. They are now in use upon the following, among other roads, viz:

Boston and Worcester, Boston and Providence, Boston and Fitchburgh, Nashua and Lowell, Providence and Worcester, Northern, N.H., Cheshire, Manchester and Lawrence, Concord, N.H., Concord and Claremont, Ogdensburg, (Northern, N.Y.) Stonington, New London Willimantic and Palmer, New Jersey Central, New Hampshire Central, Worcester and Nashua, Fitchburg and Worcester, Connecticut and Passumpsic, Lowell and Lawrence, Salem and Lowell, Wilton Branch, Newburyport.

Below will be found the certificates of a number of gentlemen, whose opinions will be good authority in every part of the country.

Office Boston and Prov. R. R.,
Boston, Dec. 28, 1849.

MR. JOHN LIGHTNER,

Sir,—*it* affords me pleasure to say, that after two years' trial of your boxes, I am fully and entirely satisfied of their superiority over any other pattern we have used. This superiority consists in economy of oil and freedom from "heating." I have tried every pattern of box in use, of any note, and do not hesitate to say, that you have devised one which in every respect combines greater advantages than any other within my knowledge; these advantages are so manifest, that I am fitting up all our cars with your boxes, as fast as practicable.

Annexed, is a statement of an experiment with your boxes, the result of which may be of use to your interests.

Ten passenger cars, running 72 wheels, fitted up with Lightner's boxes used 41¼ pints of Patent Oil, at 50 cts. per gallon, ran 43,099 miles, equal to 5·18 pints per wheel for 43,099 miles. Speed, 30 to 40 miles per hour.

Very respectfully yours,
W. RAYMOND LEE, Supt.

I have examined the above statement of Mr. Lee, and fully concur with him in his opinion of the superiority of Lightner's box.

GEORGE S. GRIGGS,
Supt. Machine Shop B. & P. R. R.

—

Boston, July 26, 1849.

This is to certify that J. Lightner's axle boxes for railroad cars and locomotive tenders, have been in use on the Boston and Worcester railroad one year, and I unhesitatingly pronounce it, in my opinion, the best and most economical one in use, requiring less oil, of easy application, not susceptible of derangement, as in most kinds in use. When requiring repairs or renewal, the same may be done in one-fourth of the time usually occupied for that purpose. The box requires oiling not oftener than once a month—is kept quite free from dust, and consequently wears much longer than those generally in use.

D. N. PICKERING,
Supt. Motive Power, B. & W. R. R.

—

Office of Boston Locomotive Works,
December 12th, 1849.

The Boston Locomotive Company have been using J. Lightner's patent axle boxes under the tenders of their engines for several months, and find them more highly spoken of by the railroad companies that have used them in regard to economy in the use of oil, their durability and their ease of adjustment, than any other boxes which they have used. We therefore do not hesitate to recommend them to all railroad companies.

DANIEL F. CHILD,
Treas. Boston Locomotive Works.

—

Taunton Locomotive Works,
Taunton, July 7, 1849.

MR. H. F. ALEXANDER,

Dear Sir,—Your favor of yesterday came to hand in which you ask what success we have met with, in using Mr. Lightner's patent box for cars, engines, &c.

We have put it in use on the Boston and Providence railroad, New Bedford and Taunton Branch railroad, Central railroad, N. J., Norfolk County, Rutland and Burlington, and as yet we have not had one complaint from them; and from what we have used of it, and witnessed, we do not hesitate to say that it is superior to anything in use for that purpose. It is simple in its construction, and easy of access, and the reservoir is held close to the shaft, and the oil and journal is perfectly secure from dust; they will run from four to six weeks without replenishing the oil. The brass in the box is changed very much easier than by any other plan that we have seen.

Very resp. yours,
W. W. FAIRBANKS, Agent.

—

Office Providence & Worcester R. R. Co.,
Providence, Dec. 17th, 1850.

H. F. ALEXANDER, ESQ.,

Sir,—The "Lightner patent boxes" for cars and locomotives have been in use under a portion of the passenger cars and engines of this company for upwards of two years, and have given very great satisfaction.

Though combining many excellent qualities, their great superiority consists in the economy of oil.

The result of experiments upon this road shows the consumption of oil by the use of this box, to be not more than one sixth part the quantity consumed by the use of the common box.

With the common box, eight passenger cars, 64 wheels, running 90 miles per day, consumed in 12 months 520 gallons of oil, being an average of 8⅛ gallon per whee per annum.

With the Lightner box the same cars running the same number of miles per day, during the same space of time consumed 73½ gallons of oil, being an average of 1⅛ gallon per wheel per annum.

So manifest are its advantages over any other box used by this company, it is intended to place it under all our cars as soon as practicable.

Besides the saving of oil, as they afford complete security from dust, we think them more durable than any other box in use.

Another advantage resulting from the use of this box is, cars run more easier than with the common box. The saving in fuel which it would effect, would of itself, we think be a sufficient inducement to use this box in preference to any other known to us.

Very respectfully,
ISAAC H. SOUTHWICK, Supt.
JOHN B. WINSLOW,
Supt. Machine Shop, P. & W. R. R.

—

Cambridgeport, April 5th, 1851.

H. F. ALEXANDER, ESQ.

Sir,—This may certify that I have been engaged in the manufacture of railway cars since 1834, and have built for the different railroad companies cars of all descriptions to the amount of three millions of dollars, and have used on the above cars all kinds of journal boxes, and find that none give better satisfaction than the "Lightner patent box," both on account of the saving of oil and the arrangement for taking out and re-placing the composition by means of the sliding key, and other conveniences which no other box possesses.

Yours respectfully,
CHARLES DAVENPORT.

—

Worcester, March 17th, 1851.

H. F. ALEXANDER, ESQ.

Dear Sir,—This is to certify that I have been for some years past engaged in building cars, and that I have tried most, if not all of the patent boxes, and have found Lightner's patent superior to all others as far as the saving of oil is concerned, also the ease with which they are fitted and exchanged in case they get out of order.

For the last three years, I have put them under all of the cars I have built, and in every instance they have given the most entire satisfaction.

Yours truly,
OSGOOD BRADLEY.

—

Office Union Works, So. Boston,
May 23d, 1851.

This certifies that I have applied Mr. J. Lightner's patent axle boxes to my locomotiues and tenders for the past two years. I consider them superior to all others,—economical in their use, and possessing many important advantages not found in any other boxes.

SETH WILMARTH.

—

Office 15, R. R. Exchange, Boston,
June 1, 1851.

This is to certify, that we have known the success of Lightner's patent journal boxes upon various roads in New England the past three years, and have been led to examine their peculiar construction.—We are well satisfied of their merits, and have adopted them upon our small gravel cars, and take pleasure, as we ever have done, in recommending their use upon all roads where we are employed in the construction.

GILMORE & CARPENTER,
Contractors.

—

Amoskeag Manufacturing Co. Machine Shop,
Manchester, May 31, 1851.

H. F. ALEXANDER, ESQ.

Dear Sir,—We are using the Lightner box on all the engines and tenders we build, and we are satisfied that it is the best box in use, and recommend the same to all those who purchase engines at our works.

Yours respectfully,
O. W. BAYLEY, Agt.

—

This is to certify that the Fitchburg railroad company having become satisfied of the superiority of J. Lightner's patent Axle Boxes for Railway Cars and Locomotive Tenders adopted the same

and are bringing them into general use upon their road.

One year's experience with the above improvement, has fully convinced me that there has never been anything offered to the public for that purpose which possess such intrinsic value; int act, this is an improvement which seems to overcome all the difficulties found in all the various kinds now in use. It possesses very many advantages over all others: Some of which are [first] the first cost is much less than that of most boxes in use. [Secondly] 75 per cent is saved in oil; one gill applied to each Journal once a month, or one quart to an eight wheel car, is all these boxes require per month [Thirdly] no dust can gain access to the Journal, which is constantly lubricated with clean oil; hence the saving in repairs of Journals and composition bearings, is a matter of importance. [Fourthly,] its construction is truly simple—not complicated, having nothing liable to become loose by constant and severe service. [Fifthly] for convenience there is nothing which approaches this improvement.—The composition bearings may be removed from the Journals of an eight wheel car, by one man, and returned, or duplicates, in twenty minutes, while under the car: the same would require two men, at least half a day with other boxes in use.—The trucks and wheels using these boxes, are free from oil and dirt, usually seen upon all railroad cars, at great expense to the corporation.

NATH'L JACKSON.
Supt. Car Building and Repairs, F.R.R. Co.

—

Boston, March 9, 1849.

I hereby certify, that I have examined a box for Car Journals, invented by Mr. Lightner of Roxbury, Mass, and I have thought so well of it that I have adopted it on our railroad, I have known of its success on other roads.

S. M. FELTON,
Supt. F. R. R.

—

Office of the Central R. R., N. J.,
Elizabethtown, May 1849.

H. F. ALEXANDER, Esq.,

Dear Sir:—Your favor, [wishing to be informed how we liked Lightner's patent axle boxes for R.R. Journals,] has been duly received; in answer we would say, we have used the boxes on Locomotive tenders one year, more or less, and on our cars some six months. I consider them the best boxes in every respect, I have ever used, or even seen used on any other roads—for safety, durability and the economy pertaining to all the details connected with the boxes and Journals of R. R. Car wheels; and we shall adopt them upon this road.

Yours Respectfully,
JOHN O. STEARNS.
Supt. Central Railroad Co., N. J.

—

Manchester, N. H., Nov. 1st, 1850.

H. F. Alexander, Sir,

I have used "Lightner's Boxes" under all the Cars of the Manchester and Lawrence railroad, and feel no hesitation in saying that I think them to be the best boxes now in use.

Yours, &c.,
THEODORE ATKINSON, Agent.

—

Cheshire R. R. Office, Keene, March 5th, 1851.

Mr. H. F. Alexander,

Sir,—Lightner's Patent Boxes have been used on the Cheshire R. R. about a year, and have given the highest degree of satisfaction.

All the Passenger Cars now in use, and a considerable number of Merchandize Cars are furnished with them, and they will take the place of the Common Boxes on all the cars as fast as circumstances will permit.

Very Resp't.
L. TILTON,
Supt. Cheshire R. R.

—

Boston and Worcester Railroad, Boston, April 1st, 1851.

H. F. Alexander, Esq.,

Dear Sir,—Lightner's Patent oil saving box for railroad cars, has been adopted by this corporation; we are taking out the common and substituting the Lightner's at the rate of fifty boxes per month; it will soon take the place of all others, as it is decidedly preferable to any heretofore used by this corporation.

G. TWITCHELL, Supt.

Statement of amount of oil used on 32 8-wheel freight cars, on the Boston and Providence Railroad (with Lightner's Boxes) from March 10, 1849, to February 27, 1851, and upon 12 8-wheeled passenger cars from September 8, 1849, to February 27, 1851.

FREIGHT CARS.

Amount Oil.	No. months.	Amount Oil.	No. months.
1.—21 pts.	10	17.—23½ pts.	14
2.—19 "	6	18.—23½ "	11
3.—25 "	13	19.—36 "	21
4.—18 "	7	20.—22 "	10
5.—22 "	12	21.—38½ "	24
6.—24 "	13	22.—29 "	23
7.—20 "	11	23.—35½ "	23
8.—21 "	11	24.—37½ "	23
9.—23½ "	10	25.—51 "	23
10.—21 "	9	26.—31½ "	24
11.—20 "	9	27.—28½ "	23
12.—21½ "	11	28.—36 "	23
13.—19 "	8	29.—50½ "	24
14.—25½ "	17	30.—50 "	23
15.—20½ "	10	31.—41 "	23
16.—31 "	18	32.—39½ "	23
		Total, 925½ pts.	510

PASSENGER CARS.

1.—19½ pts.	18	7.—30 pts.	18
2.—25½ "	18	8.—25½ "	18
3.—33½ "	16	9.—29 "	18
4.—19 "	15	10.—46½ "	17
5.—15 "	15	11.— 9 "	9
6.—22 "	18	12.—65½ "	17
		Total, 340 pts.	197

Averaging 1 4-5 pints of oil for freight, and 1 7-10 for passenger cars per month only!

All orders and enquiries promptly attended to.

BRIDGES & BROTHER,
No. 64 Courtlandt st., New York.

July 25, 1851.

To Boiler Makers, Engineers, etc., etc.

PATENT LAP-WELDED IRON TUBES,
Manufactured by the
BIRMINGHAM PATENT IRON TUBE CO.
UNDER
PROSSER'S PATENT,
from one and a quarter to eight inches in diameter.

These tubes are well known for their superiority over all other descriptions for Locomotive, Marine and other Steam Engine purposes, for which they are used very extensively in Great Britain and on the Continent of Europe.

For sale in quantities to suit purchasers, by
WILLIAM BIRD & CO.,
44 Wall st., New York.

July 26, 1851.

To Railroad Companies.

THE undersigned has discovered and patented an imperishable, cheap, and sufficiently elastic substance, to be introduced between the sill and rail, so that the stone sill can be used in place of the wooden sill: entirely overcoming that rigidity where the rail is laid directly on stone. Address

J. B. GRAY, Philadelphia.

July 10, 1851. 4m

To Contractors.

Peru and Indianapolis Railroad.

PROPOSALS will be received at the office of the Peru and Indianapolis Railroad, in Noblesville, until the evening of the 13th of August next, for the Grading of the line of the above road from Noblesville to Peru, a distance of fifty miles. Also the masonry for Bridges over the Wabash, Big Pipe and White Rivers.

The proposals are to be addressed to W. J. HOLMAN, Esq., Chief Engineer, at the Company's Office, where plans and specifications of the work may be seen. Payments will be made monthly in cash, reserving 15 per cent. till the contracts are completed.

Indianapolis, July 12, 1851.

European and North American Railway.

THE undersigned, the three persons first named in the first section of an act passed by the Legislature of Maine, and approved the twentieth day of August last past, entitled "An Act to incorporate the European and North American Railway Company," and being specially authorised therefor in and by said act, hereby give public notice that, for the purpose of receiving subscriptions to the stock of said company, as established by the act aforesaid, according to the provisions thereof, not exceeding forty thousand shares, books of subscription will be opened under the direction of the undersigned, according to the regulations prescribed, at the time and places following, viz:—On WEDNESDAY, the Twentieth day of August next,

At Calais, Maine,	with	Noah Smith, Jr., Esq.
Eastport,	do. "	Col. Bion Bradbury.
Machias,	do. "	Walker & O'Brien,
Ellsworth,	do. "	Seth Tisdale, Esq.
Oldtown,	do. "	Geo. P. Sewall, Esq.
Bangor,	do. "	Geo. W. Pickering, Esq.
Orono,	do. "	Hon Israel Washburn, Jr
Waterville,	do. "	Hon. Timothy Boutelle.
Brunswick,	do. "	Prof. William Smyth.
Augusta,	do. "	B. A. G. Fuller, Esq.
Belfast,	do. "	John Y. McClintock, Esq.
Portland,	do. "	John B. Brown, Esq.
Portsmouth,	N.H.	Hon. I. Goodwin.
Salem,	Mass.	Stephen A. Chase, Esq.
Boston,	do. "	Francis Skinner & Co.
Lowell,	do. "	John Wright, Esq.
Worcester,	do. "	Charles Washburn, Esq.
Providence,	R.I., "	Billings Brastow, Esq.
Hartford,	Conn., "	Hon. C. F. Pond.
New Haven,	do. "	Allen Prescott, Esq.
New York,	N.Y., "	R. & G. L. Schuyler, No 2 Hanover street.
Albany,	do. "	John V. L. Pruyn, Esq.
Troy,	do. "	Hon. John D. Willard.
Philadelphia,	Pa. "	Hon. Wm. C. Patterson.
Montreal,	Canada,	Hon. John Young.
Quebec,	do. "	J. B. Forsyth, Esq.

Said books will remain open for ten successive days at the places and with the persons aforesaid.

Dated at Portland, this sixteenth day of June, A. D. 1851.

ELIJAH L. HAMLIN,
ANSON G. CHANDLER,
JOHN A. POOR.

Trautwine on R. R. Curves.

By JOHN C. TRAUTWINE, Civil Engineer,
Philadelphia, Pa.

IN press, and will be published in a few days; accompanied by a Table of Natural Sines and Tangents to single minutes, by means of which all the necessary calculations may be performed in the field.

This little volume is intended as a field-book for assistants; and will be found extremely useful, as it contains full instructions, (with wood cuts) for laying out, and adjusting curves; with Tables of Angles, Ordinates, etc., for Curves varying from 1/3 miles, down to 146 feet Radius.

A portable Table of Natural Sines and Tangents to minutes, has for a long time been a desideratum among Engineers, independently of its use in laying out curves.

The volume is neatly got up in duodecimo; and handsomely bound in pocket-book form.

Sold by Wm. Hamilton, Actuary of the Franklin Institute, Philadelphia. Price $1.

Also in press, and will be issued in a few weeks, "*Trautwine's Method of Calculating Excavation and Embankment.*"

By this method, which is entirely new, (being now made known for the first time) the cubic contents are ascertained with great ease, and rapidity, by means of diagrams, and tables of level cuttings. Thin octavo; neatly half bound, $1. For sale by Wm. Hamilton.

June 28, 1851.

Railroad Iron.

CONTRACTS made by the subscribers, agents for the manufacturers, for the delivery of Railway Iron, at any port in the United States, at fixed prices, and of quality tried and approved for many years, on the oldest railways in this country.

RAYMOND & FULLERTON, 45 Cliff st.

Notice to Contractors.

Steubenville and Indiana Railroad.

PROPOSALS will be received at the Office of the Steubenville and Indiana railroad company in Steubenville, until the first day of October next, for the Grading and Masonry of the first division of the road extending from Steubenville to the Connotten valley and also for the construction of the entire road between Steubenville and Coshocton; and also distinct proposals for the construction of that portion of the road extending from Coshocton to Newark.

The entire length of this line is about 110 miles, and it contains work of all descriptions, in great variety, some of which is quite heavy.

Proposals will be received for the Grading and Masonry of the first division entire or in sections of about a mile each, the Company reserving the privilege to make such disposition of the whole work, as may appear most conducive to its interests.

Plans, profiles and specifications can be seen at the office of the Company after the 15th of September, and further information may be obtained on application to J. Blickensderfer, jr., Chief Engineer, or to the undersigned,

D. KILGORE, President.

Notice to Contractors.

Engineers Office, E. T. & V. R. R. Company, Greenville, E. T., June 5th, 1851.

PROPOSALS will be received until the 1st day of October next, for the Grading and Masonry of that part of the E. T. & V. Railroad between the Eastern terminus of said road at King's Meadow, and Rheatown, in Greene County, a distance of about forty-seven miles. A large amount of very heavy work, both in Grading as well as Masonry, will be found on this division, offering strong inducements to able Contractors.

Maps, Profiles, and Specifications can be seen at this Office, on and after the 20th of July next.

The Company reserve the right to reject all, or any proposals that they deem unsatisfactory.

Proposals should be directed to the Treasurer and Secretary of the E. T. & V. Railroad Company, Jonesborough, E. T.

LLOYD TILGHMAN,
Chief Engineer.

Railroad Lanterns.

COPPER and Iron Lanterns for Railroad Engines, fitted with heavy silver plated Parabolic Reflectors of the most approved construction, and Solar Argand Lamps; manufactured by

HENRY N. HOOPER & CO.,
No. 24 Commercial St. Boston.

August, 16, 1849. 6m33

Railroad Iron.

THE Subscribers, Agents for the Manufacturers, are prepared to contract for the delivery of Railroad iron at any port in the United States or Canada, or at a shipping port in Wales.

WAINWRIGHT & TAPPAN,
29 Central Wharf.

Boston, June 1, 1851.

Bowling Tire Bars.

40 Best Flange Bars 5½x2 inches, 11 feet long.
40 " " 5½x2 " 7 feet 8 in. long.
40 " Flat " 6x2 " 11 feet long.
40 " " 6x2 " 7 feet 8 in. long.

Now in store and for sale by

RAYMOND & FULLERTON,
45 Cliff street.

To Railroad Companies, Machinists, Car Manufacturers, etc., etc.

CHARLES T. GILBERT,

NO. 80 BROAD ST., NEW YORK,

IS prepared to contract for furnishing at manufacturer's prices—

Railroad iron,
Locomotive Engines,
Passenger and Freight Cars,
Car Wheels and Axles,
Chairs and Spikes.

Orders are invited; and all inquiries in relation to any of the above articles will receive immediate attention.

THE Fourth Annual Exhibition of AMERICAN MANUFACTURES, by the MARYLAND INSTITUTE *for the Promotion of the Mechanic Arts*, will be opened in Baltimore on the 20th October, 1851.

The Exhibition will be held in the SPLENDID NEW HALL of the Institute, (fronting on Baltimore street) now being rapidly completed. Their edifice is centrally situated, chaste in its architecture, solid in its construction, and is *by far the largest and most complete building in the United States, devoted to the Mechanic Arts.* It may be added that this building is 355 feet long by 60 in breath, with an average height of 68 feet, containing some twelve apartments, the largest of which is 255 feet by 60, and that the cost will be over $70,000.

To this Exhibition, the Managers ask the attention of all engaged in industrial pursuits throughout the country, and cordially invite them to contribute specimens of their best productions for public inspection, and to compete for the prizes offered by the Institute. These prizes consist of GOLD and SILVER MEDALS, DIPLOMAS, etc., which were last year distributed as follows:—*Gold Medals*, 16; *Silver ditto*, 90; *Diplomas*, 60; besides 85 articles of Jewelry, etc., to ladies. *Fair play will be scrupulously observed towards all*, and every facility of Steam power, shafting, fixture, labor, &c., &c., will be amply provided *free of expense*. The machinery will be under a special superintendent, and a fine display of it is looked for. The last exhibition of the Institute was visited by more than 40,000 persons, and with their vastly improved accommodations and alterations, this number will be doubled at the coming display, embracing many Virginians, Pennsylvanians, and other strangers from the South and West.

Joshua Vansant, President.
Ed. Needles, F. A. Fisher, } Vice Presidents.
Samuel Sands, Rec. Sec'y.
Wm. Prescott Smith, Cor. Sec.
F. J. Clare, Treasurer.

BOARD OF MANAGERS.

Ross Winans,	Simeon Alden,
P. S. Benson,	J. T. Watson,
Josiah Reynolds,	W. Robinson,
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John F. Davis,	*Saml. E. Rice*,
Wm. H. Keighler,	*John F. Mereditt*,
Richard Edwards, Jr.,	*W. Abrahams*,
Wm. Bayley,	*Thos. Trimble*,
R. Eareskson,	*Chas. Suter*.

(☞ The last nine *in Italics* are the Committee on Exhibition.)

The Hall will be opened for the reception of goods on MONDAY, 13*th October*; on the next Monday, 20th, at 7 P. M., the Exhibition will be formally opened to the public, and will *positively* close on Wednesday, 19th November. Articles *for competition* must be in the Hall by *Thursday* night, Oct. 16, *unless delayed in shipment after starting in ample time.*

Those who intend depositing, will give the Committee or the Agent, notice as early as possible, stating *the nature of the goods, and probable amount of room required*, to exhibit them to advantage

☞ Circulars, containing a view of the new Hall and the full regulations of the Committee, with special information, if required, may be had promptly, by addressing the undersigned, or the Institute's Agent, J. S. Selby, Baltimore, *post-paid.*

ADAM DENMEAD,
Chairman Com. on Exhibition for 1851.

SUPERIOR BLACK WRITING & COPYING INK.

Jones' Empire Ink.

87 Nassau st., Sun Building, New York city.

Net prices to the trade—

Quarts, per dozen,	$1 50	6 oz. per dozen,	$0 50
Pints, "	1 00	4 " "	0 37½
8 ounces, "	0 62½	2 " "	0 25

On draught per Gallon, 20 cents.

This is the best Ink manufactured, it flows freely, is a good copying ink, and will not mould, corrode, precipitate or decay. Orders for export, or home consumption, carefully and promptly attended to by

21tf THEODORE LENT.

To Railroad Companies, etc.

The undersigned has at last succeeded in constructing and securing by letters patent, a Spring Pad-lock which is secure, and cannot be knocked open with a stick, like other spring locks, and therefore particularly useful for locking Cars, and Switches, etc.

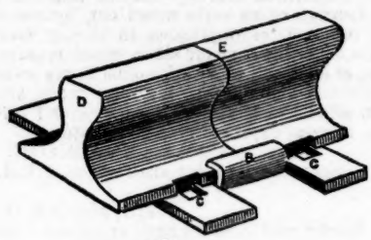
I also invite attention to an improved PATENT SPRING LOCK, for SLIDING Doors to Freight and Baggage Cars, now in use upon the Pennsylvania Central, Greensville and Columbia, S.C., Reading, Pa., and other Railroads.

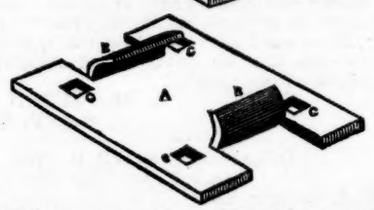
Companies that are in want of a good Pad-lock, can have open samples sent them that they may examine and judge for themselves, by sending their address to

C. LIEBRICH,
46 South 8th St. Philadelphia.

May 9, 1851.

The American Railroad Chair Manufacturing Co.





ARE prepared to make WROUGHT IRON RAIL ROAD CHAIRS, of various sizes, at short notice.

By use of the WROUGHT IRON CHAIR, the necessity of the wedge is entirely done away—the lips of the chair being set, by means of a sledge or hammer, close and firmly to the flange of the rail.

The less thickness of metal necessary in the Wrought Iron Chair gives much greater power and force to the spikes when driven—and consequently a much less liability to the spreading of the rails by reason of the spikes drawing or becoming bent.

The less weight necessary in the Wrought Iron Chair, will enable us to furnish them at a cost much below that of CAST IRON CHAIRS.

DESCRIPTION OF THE ABOVE CUTS.

Figure 1 is a perspective view of the rail secured in the chair, and fig. 2 is a perspective view of the chair itself. D, E, are sections of two rails placed together, and secured at the joint on the chair by the jaws *B*, B. The chair is bolted down by spikes C, C. In fig. 2, the chair is represented as made of a single block or plate A of wrought iron.

The chair is set in its proper place on the track, spiked down, and the ends of the two rails brought together within the jaws as represented in fig. 1.

For further information address,

N. C. TROWBRIDGE, Secretary,
Poughkeepsie, N. Y.

June 1, 1851.

Railroad Commission Agency.

THE Subscriber offers his services to Railroad Co's and Car Makers for the purchase of equipment and furniture of roads and depots and all articles and materials required in the construction of cars, with cash or approved credit. No effort will be spared to select the best articles at the lowest market price.

He is sole Agent for the manufacture of the ENAMELED CAR LININGS, now in universal use. The best Artists are employed in designing new styles, and he will make to order pieces with appropriate designs for every part of the car, in all colors, or with silver grounds and bronzed or velvet figures.

He is also Agent for Page's Car Window Sash Fasteners, which is preferred by all who have used it to any other.

CHARLES STODDER,
75 Kilby st., Boston.

June 20, 1851. 3m.